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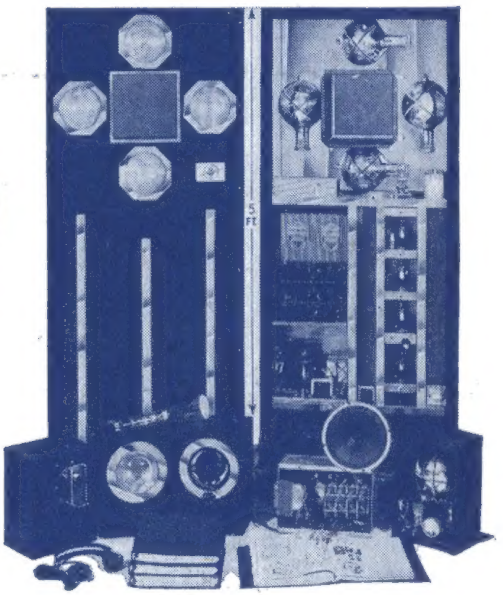

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Sept. 1938

Mechanics AND HANDICRAFT

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NED L. PINES, *Publisher*

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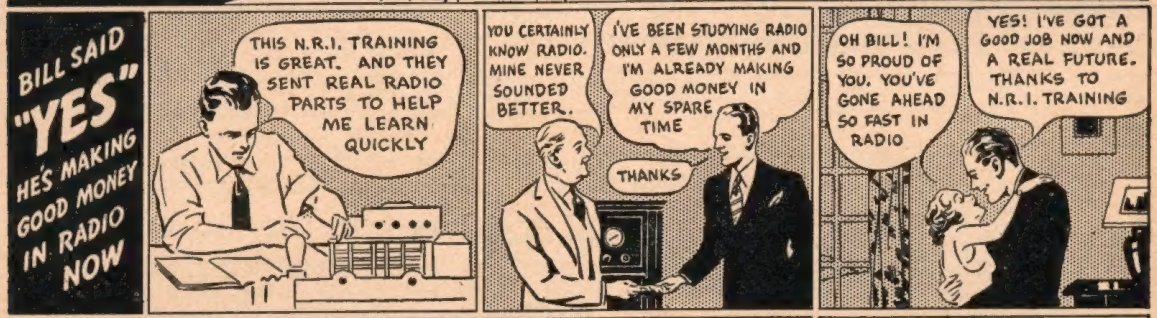
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THANKS
OH BILL! I'M SO PROUD OF YOU. YOU'VE GONE AHEAD SO FAST IN RADIO
YES! I'VE GOT A GOOD JOB NOW AND A REAL FUTURE. THANKS TO N.R.I. TRAINING

TOM SAID "NO" HE'S STILL WAITING FOR "LUCK"
BILL'S A SAP TO WASTE HIS TIME STUDYING RADIO AT HOME
SAME OLD GRIND -- SAME SKINNY PAY ENVELOPE -- I'M JUST WHERE I WAS FIVE YEARS AGO
GUESS I'M A FAILURE. LOOKS LIKE I'LL NEVER GET ANYWHERE
YOU'LL ALWAYS BE A FAILURE, TOM, UNLESS YOU DO SOMETHING ABOUT IT. WISHING AND WAITING WON'T GET YOU ANYWHERE

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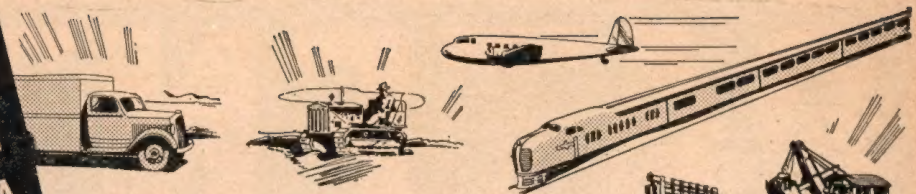

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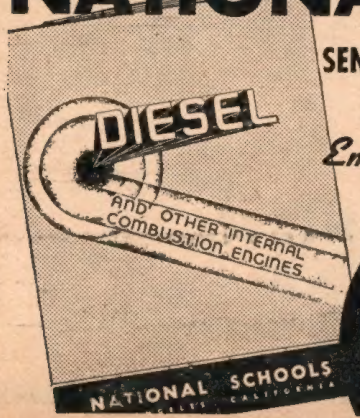

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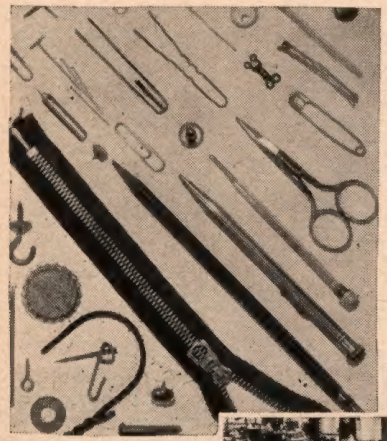

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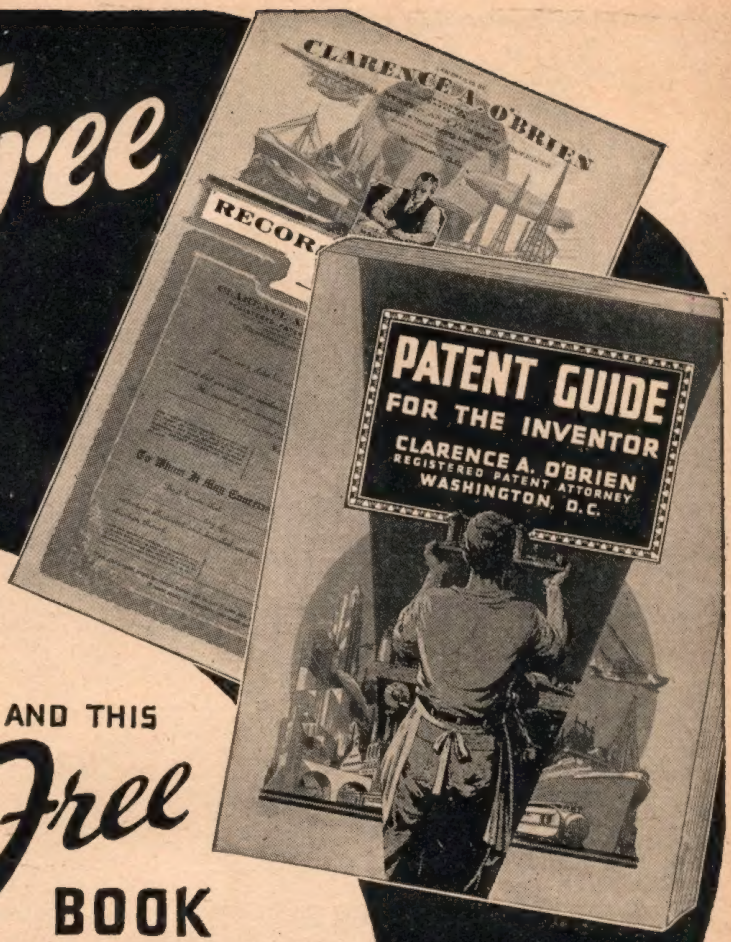

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This magazine will pay $1.00 for each scientific question and answer accepted and published. Questions may be on any subject dealing with any science, including invention, mechanics, and handicraft. Source of information (that is, name of book or authority) must be given. No questions will be returned. Address all material to What Do You Know Editor, in care of MECHANICS AND HANDICRAFT, 22 West 48th St., New York, N. Y.

QUESTIONS:

Rate yourself 10% for each question answered correctly. Thirty-five percent is a good mark.

1—When a parachutist falls from an airplane what is his initial speed?—WYCLIFFE D. MILLER.

2—At what temperature does one full quart of water weigh the most?—BILL TRACY.

3—Where is Madstone found? It has been considered more precious than gold.—MILAN BULKO.

4—What is the natural color of gold fish?—ROY KAUFMAN.

5—Would you eat Taunton turkey with cranberry sauce on Thanksgiving Day?—LILLIAN THOMPSON.

6—Catgut generally comes from what animal?—MRS. H. T. VINSON.

7—Two trains starting from the same point and travelling at the same speed on parallel tracks make no stops to arrive at the same destination. How do you account for the fact that it takes the first train one hour and twenty minutes to make the trip yet the second train makes it in only eighty minutes?—LARRY H. MANHEIMER.

8—What is a Chinook?—EDWIN R. FAY.

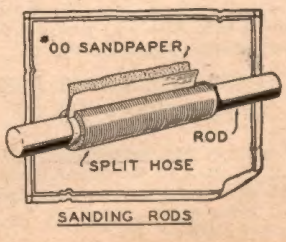
9—What metal is giving off heat constantly?—JOHN KACERE.

10—How many bones are there in the human body?—GEORGINA VALENTINE.

Answers on page 12

Sanding Round Rods

THIS stunt will save sandpaper and do a better, cleaner job on round rods. Split a hose lengthwise, wrap sandpaper around rod, then slide hose into place as shown. — G. BATCHELDER.



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What Do You Know?

Answers to questions on Page 10

1—The parachutist's initial speed is the speed of the airplane at the instant of the parachutist's fall.

2—A quart of water weighs the most at 39°F. At this point, water has its greatest density.

3—Madstone is a stone or other substance, frequently a ball of hair, obtained from the stomach of an animal. It was popularly supposed that it had mystic curative properties and that it would absorb venom when applied to snake bite wounds or would cure hydrophobia.

4—The golden yellow color of gold fish is found only in domesticated specimens and is retained by artificial selections. Reared by the Chinese in small ponds, and kept for ornaments, many strange varieties have been produced by careful selection. However, in large ponds, they rapidly revert to the color of the original stock—a drab greenish state.

5—You might eat Taunton turkey with cranberry sauce but Taunton turkey is a fish.

6—Sheep.

7—There are sixty minutes in an hour, therefore, one hour and twenty minutes is eighty minutes. Did this one fool you?

8—A Chinook is a warm, dry wind blowing down the eastern sides of the Rockies over the adjacent plains in Canada and the United States. In winter this wind melts the snow very rapidly and has hence been called "Snow-eater."

9—Radium.

10—There are 206 bones in the human skeleton.

A Good Hint for Cementing Camera Covering

IF the leather on your camera should come loose, try film cement for gluing it back in place. Apply a layer of this cement both to the leather and the camera; allow both pieces to become tacky, then put together and iron out with the palm of your hand. In a few minutes the camera will be ready for use.—A. PEGDAN.

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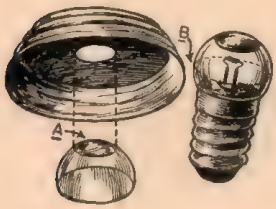
Ideal Simple Microscope

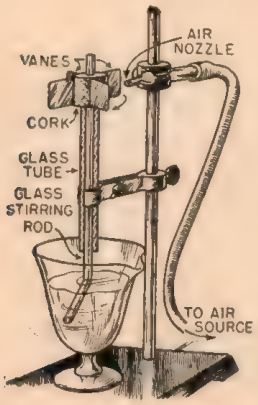
BETTER than the water drop microscope is this simple construction which can be made at an expenditure of but 10c. With this simple microscope, one can observe the slipper animalcule (paramecium) generally found in stagnant water. A 10c lens type of flashlight bulb is broken off as shown at B; this is then pushed into an opening drilled through an ordinary jar top as shown at A. The drop of water containing the microscopic organisms is placed into the cup-like receptacle where it remains because of the property of cohesion. The structures are viewed by facing northlight or a lamp ten feet away.

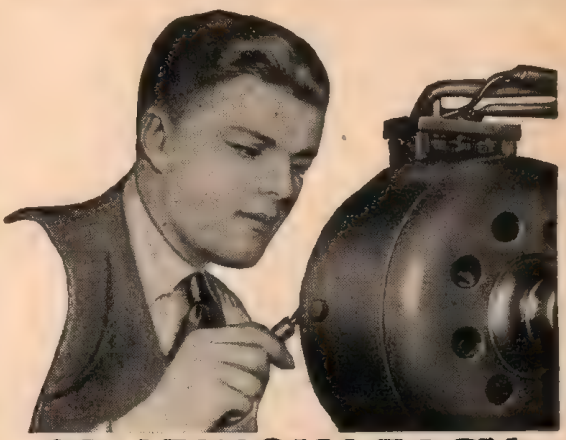


—E. H. EDWARDS.

Laboratory Stirrer

CHEMICAL experiments often call for constant stirring, and while many mechanical stirrers are available, most are beyond reach of the home experimenter. A very simple stirrer, operated by air, can be made from glass tubing, a glass rod, some thin pieces of sheet metal and a cork. The glass rod should be bent as shown and should fit the tubing loosely. To the top of the rod attach a cork slotted to receive four sheet metal vanes. A small air pump, or an inflated inner tube, supplies the source of power.—B. K.





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(Continued on page 16)

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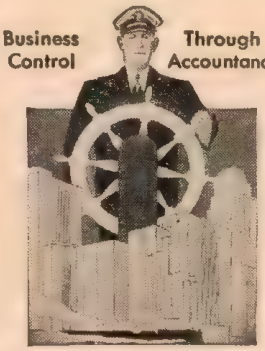

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(*Continued from page* 14)

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(*Continued on page* 18)

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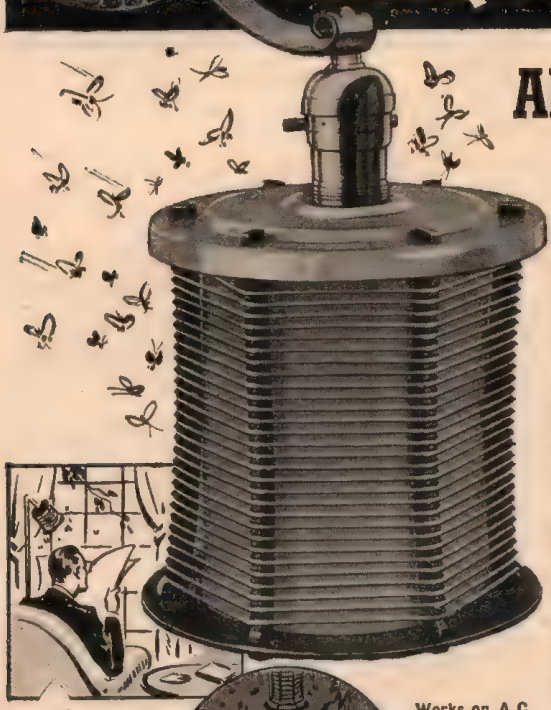

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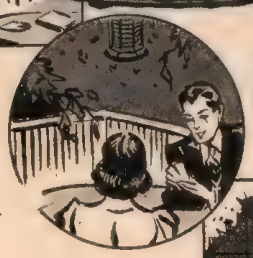

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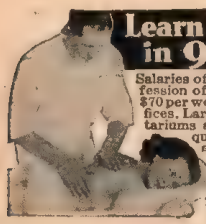

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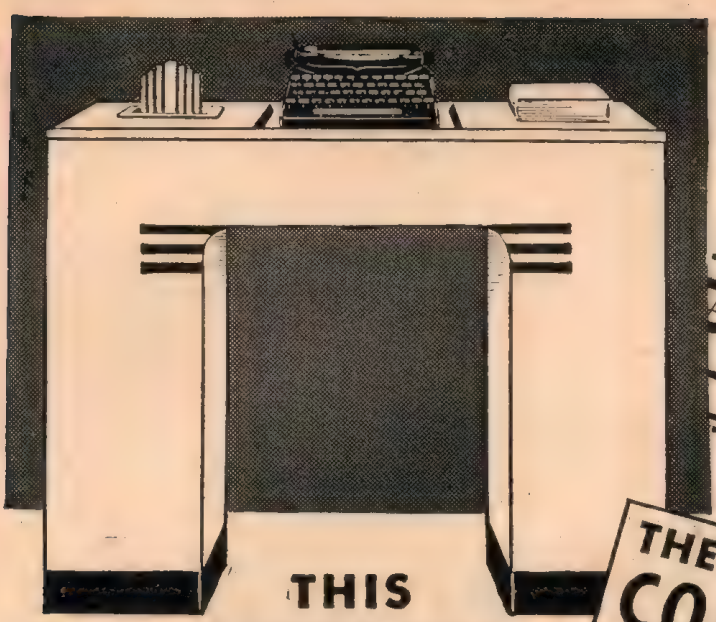

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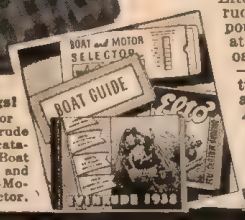

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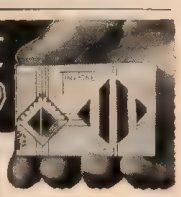

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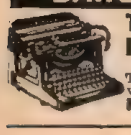

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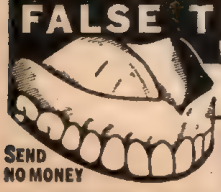

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EDITORIAL

PLANS for the submarine exploration of Arctic waters* by Sir Hubert Wilkins are nearing completion. The specially designed submarine most probably will be built this winter in England for a first trial next spring. Commercially and scientifically, much of value should be secured, but it would require more than a stretch of the imagination to see where such a trip would "benefit the National Defense Plans of the U. S."

It might be mentioned that Simon Lake, pioneering submarine inventor, designed a craft for northern route passage and for similar under-the-ice explorations many years ago. While such vessels would greatly extend our scope of knowledge, it would seem that much greater riches could be plucked from our back yards. Hundreds of billions of dollars of wealth are locked in the seas, not only in the form of cargoes of sunken vessels, but also in the nature of vegetation, chemicals, minerals (including gold washed down to the sea), and vast stores of food. . . . All these are available for the asking. Yet, lethargy and stagnation seem to have enshrouded the many inventors and organizations which planned to tap these vast riches.

Although much apparatus had been built and many salvaging trips had been financed, no serious attempt to use any was ever made in the United States. . . . We all know of the scratch made in the surface by the Ethyl Dow Chemical Company which is extracting bromine from sea water (now used for the preparation of Ethyl Gasoline), and of J. E. Williamson's use of an apparatus (invented by his father) for the production of a number of sub-sea motion pictures, but the wealth thus secured is insignificant by comparison.

Your editor walked the bed of Long Island Sound in Simon Lake's apparatus, spent many a day on Williamson's "hole in the water," and often pondered about the total disregard the operators showed for the wealth lying within arm's reach—hundreds of anchors and chains, sunken barges containing coal, and of even greater economic consequence, vast fields of kelp, oysters, clams, mussels (a bivalve delicacy which has completely fallen from grace), and countless other valuables. Harvesting the ocean is an industry which should prove profitable and give work to distressed thousands.

* The first exclusive interview on the aims and purposes of such a trip was outlined to our representative and published in the January 1936 issue of this magazine.

* * *

UNQUESTIONABLY, the location of radio buoys in the ocean and in the wide open spaces of the Canadian Northwest, to transmit information regarding barometric pressure

JOTTINGS

changes, temperature, precipitation and wind direction, would be of incalculable value to our Weather Bureau. Operated by a clock-work mechanism, these buoys could send out data by code signal every minute of the day and night . . . sixty such stations could report within an hour. . . . The Coast Guard could service those stations near shore. . . . With all stations operating on the same wave length, only one channel need be occupied. Congress could appropriate the money for the research and equipment now. This would aid the Weather Bureau in arriving at more accurate forecasts and would certainly help trans-Atlantic aviation when it starts.

* * *

MANY garages are equipped with scientific instruments to show what is going on in the motor of your car. The average layman does not know, however, that the garage mechanic can regulate a knob to make the dial of the meter show what he wants it to demonstrate. Many a car owner is "fleeced" into paying for repairs, or adjustments, which are not required. Of course, the instruments pay for themselves in short order. They are a modern version of the "shell and pea game."

* * *

'TIS, 'tisn't, 'tis—that seems to explain the bandying about given to spinach by the scientists. The latest version is that spinach is wholesome, valuable, a rich source of vitamin A, contains vitamin C, iron and roughage, but that the iron is not a good source for infants because too much spinach would have to be eaten by them to get a satisfactory amount. Those who read the last statement on spinach in this magazine and offered this publication in support of the claim that spinach was no good, can now refute the statement with equal force. . . . But, most probably they won't do so.

* * *

SOME people have an uncanny faculty of driving a car directly to its destination. The orientation of others is completely disturbed by one trip around the block. . . . Scientists have discovered that some people entering a windowless room can point to any location requested. . . . Dr. Paul D. Woodring observed that college students are just as likely to have, or lack, a sense of direction as are morons, but believes that the ability is a habit rather than a special instinct. . . . The person who lacks this "homing habit" does not know of its non-existence, and can't help it. . . . But then, even some auto-compasses are notoriously inaccurate.

JOSEPH H. KRAUS,
Editor.

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A NEW INDUSTRY

OPENING UNLIMITED NEW OPPORTUNITIES for "FIRST-IN-FIELD" PROFITS..NO HOUSE-TO-HOUSE CANVASSING

Out of obscurity to national prominence—the history of this new business invention. In business offices throughout the U. S. this invention is opening up a new, rich source of cash income and cutting operating costs to the extent of countless thousands of dollars. Today—now, as you read this, business firms—large and small—schools, newspapers, hospitals, manufacturers, etc.—are making substantial installations, after testing small trial units. Representatives are making profits far beyond average. For example, L. F. Strong, Kansas, turns in $163.38 profit in two days. S. Clair, New York, $70 in a single day. It isn't all a matter of selling the customer only ONE time, either. H. Cooley, Oklahoma, writes: "My ELEVENTH repeat order. From all indications, I will be able to double my output the next few weeks. Money-making possibilities are unlimited." J. Olinger, Iowa: "The very first day, I netted $25.00 clear profit. This proposition is a good clean business profession." C. W. Ferrell, passes 1,000 sale mark, each paying from $5 to $60 net profit per sale. E. T. Wilson, Georgia, $46.70 one day's profit, three hours work, $58.00 another day, five calls. I. J. Keuper, Delaware, over $1,000 clear his first month. And so forth, more than we can mention here.

These men are beginners. How could they enter a field totally new to them and earn such remarkable sums in these desperate times? Read about a new business that does away with the need for high pressure selling. A rich field that is creating new money-making frontiers for wide awake men. Those who enter now will pioneer — to them will go the choicest opportunities.

Four $15 Sales Daily— PAY $280 WEEKLY

INSTALLING NEW BUSINESS SPECIALTY ON FREE TRIAL MAKING ENORMOUS CASH SAVINGS IN OPERATING COSTS for THOUSANDS OF FIRMS THROUGHOUT THE U.S. & CANADA

$4,707 SAVINGS FOR ONE KANSAS STORE IN 2 MONTHS

Sanders Ridgway of Kansas turns $88.60 investment into $4,707.00 cash! Pollom & Son, Indiana, in 45 days turn $15.00 investment into $2,250 cash. Pfeiffer Co., Illinois, investment $45.00; turned into $2,601.14 cash. Thames Lumber Co., Conn., get $1,026.84 out of $15 investment!

With these and scores of similar results to display, our representatives interest every business man, from the very smallest to the very largest. No one can dispute the proof in the photo—copies of actual letters which our men show.

NO HIGH PRESSURE—SIMPLY INSTALL—SELLS ITSELF

Here is a business offering an invention so successful that we make it sell itself. Our representatives are now instructed not to attempt any selling whatsoever! They simply tell what they offer, show proof of success in every line of business and every section of the country. Then install the specialty without a dollar down. It starts working at once.

PRODUCES THE CASH TO PAY FOR ITSELF BEFORE PAYMENT DUE

In a few short days, the installation has actually produced cash money that is there and available to pay for itself, with profits above the investment coming in at the same time! The representative calls back, collects his money.

YOUR PROFITS

OUT OF EVERY $75 BUSINESS THE REPRESENTATIVE DOES, NEARLY $60 IS HIS OWN PROFIT! THE SMALLEST HE MAKES IS $5 ON A $7.50 INSTALLATION! And the deal has been made without toil and trouble, without high pressure, without drudgery, without argument! Nothing is so convincing as our offer to let results speak for themselves! While others fail to even get a hearing, our men are making sales running into the hundreds. They are getting the attention of the largest concerns in the country, and selling to the smaller businesses by the thousands. Business is GOOD, in this line, in small town or big city alike! It's on the boom now. Get in while the business is young!

A BRILLIANT RECORD of SUCCESS

Either the parent companies, branches, or dealers, etc., of America's foremost concerns are among our customers: Cities Service Oil Co., Great Lakes Fisheries, Inc., Chevrolet, Union Gas Corp., Consolidated Motor Lines Corp., Street Railways Advertising Co., American Life Underwriters, and scores of others nationally known. Thousands of small businesses everywhere; professional businesses; such as universities, newspapers, hospitals, infirmaries, doctors, etc., buy large installations and heavy repeat orders.

CASH PROFIT GUARANTEED

Customer gets signed certificate guaranteeing cash profit on his investment. Very few business men are so foolish as to turn down a proposition guaranteed to pay a profit, with proof from leading concerns that it does pay.

IMPRESSIVE PORTFOLIO OF REFERENCES FROM AMERICA'S LEADING FIRMS CLOSES THE DEAL

You receive a handsome, convincing portfolio containing photographic copies of actual letters reporting cash savings and giving endorsements from concerns whose names are familiar everywhere as representing the very best, the very largest companies. These letters come from every leading type of business and profession. Small as well as large are represented. You immediately forestall the argument, "Doesn't fit my business." All question removed. Shows that it does fit, and does make good. Closes the sale.

START ON SMALL SCALE

You can start small and grow big. You can get exclusive rights. With profits from your first business you can open an office, hire salesmen, branch out into open territory. Exclusive contract enables you to build an established permanent business which can be sold like any other business. Give your customers satisfactory service and they will be your prospects for repeat orders as long as they are in business. Full opportunity for investigation. SEND NOW FOR FULL INFORMATION. Mail the coupon to

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TEST THIS BUSINESS WITHOUT RISKING A DOLLAR OF YOUR OWN

You try out this business, ABSOLUTELY WITHOUT RISKING A DOLLAR OF YOUR OWN.

COMPLETE TRAINING FURNISHED

Many men at scratch, with us today started without previous experience, many coming from jobs of clerking in small businesses, many out of large businesses, some of the biggest money-makers of the business. We teach every angle of the business, we hand you the limited space tell you all in the limited space available here. Mail the coupon now for full information —nothing to risk, everything to gain.

FIRST CHOICE TO FIRST COMERS- Mail this Coupon NOW!

RUSH COUPON FOR FULL INFORMATION

TERRITORY FILLED IN ORDER OF APPLICATION

If you are looking for a man-size business, free from worries of other overcrowded lines of work, GET IN TOUCH WITH US AT ONCE. Learn the possibilities now before the franchise for your territory is closed. Use the coupon for convenience. It will bring you full information and our proposition immediately.

MAIL FOR FULL INFORMATION

F. E. Armstrong, Pres., Dept. 4086-J, Mobile, Ala.

Without obligation to me, send me full information on your proposition.

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SEPTEMBER, 1938
Volume 5
Number 8

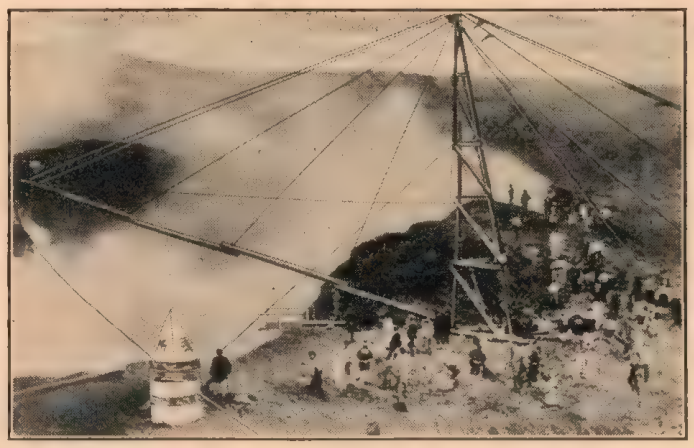
Mechanics AND HANDICRAFT

Into a Volcano

Daring newspaper men penetrate Japan's suicide crater to dispel mysticism enshrouding the celebrated death hole. In a special insulated gondola they break world's record for such attempts.

THERE is a small island in Japan called Oshima. Travellers who have entered Japan by way of Yokohama are familiar with its eternal beauty. Its smallness has been compensated by the dominating, and one of the most spectacular active volcanoes on the Nipponese Islands.

The volcano of Mihara Yama is not by any means a cosmic wonder. Its spectacularity lies in the fact that its crater has become a popular rendezvous with death for hundreds of Japanese suicides.



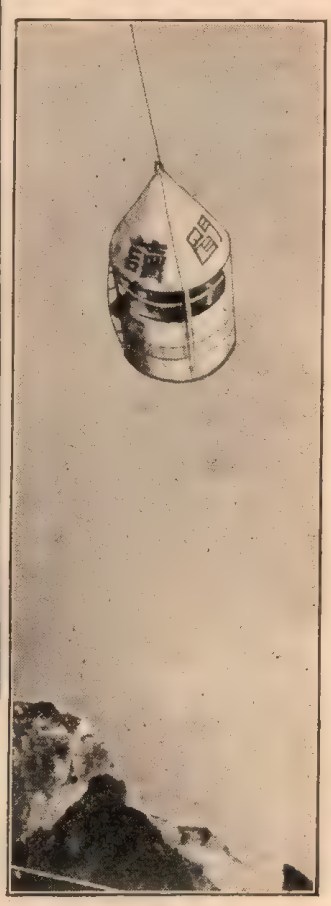
Before the descent into the crater of Mihara Yama. Here we see the asbestos-covered steel gondola which was used by journalists in an attempt to discredit the sacredness of suicides who would use the earth's internal fires to consume their bodies rapidly and send their spirits heavenward. Since the beginning of the depression, abetted by the hardships resulting from the war in China, the number of Japanese suicides has increased alarmingly.

Everyone knows that "hara - kiri" is considered an honorable way of taking one's life, when one cannot face his fellowmen in constant disgrace. But since 1934, according to Japanese authorities, suicidal disembowelment has lost its popularity and has been given up for a much easier way; that of jumping three thousand feet down into the gaping mouth of Mihara Yama Volcano —a "glorious" end, so swift that before the body reaches the bottom of the pit, the soul is snuffed out of every pore of the flesh and carried away to eternity by strong sulphuric fumes which issue constantly from the crater.

Since 1934, authorities have been making an effort to stop the suicides "en masse" that have been taking place ever since the Japanese began to feel the pinch of universal depression, made worse by the pangs of war in China.

According to an estimate issued by the authorities, more than two hundred persons plunged into the burning abyss of Mihara Yama in 1934. The number, though small in comparison with other methods of committing suicide, a popular pastime with Japanese, nevertheless

A few moments after the photo at the left was taken, 125 feet below the mouth of the crater, the two journalists disappeared from view. By means of telephonic communication they were able to keep in touch with those operating the crane. A new attempt will be made on this and other volcanoes, using a gondola similar to the one illustrated on the front cover of this issue.



As the gondola was lowered into the crater of Mihara Yama, spectators could observe one of the journalists extending his camera through the window of the gondola. One of the photographs taken enroute is shown below. Unfortunately, the increase in sulphurous vapors prevented the taking of any pictures deep down in the crater. In addition to the protection the gondola offered journalists, they were clad in asbestos suits.

created alarm because of its seriousness, from both political and moral standpoints.

With the idea spreading like wildfire throughout the land of the Mikado, that this form of suicide was far more sacred than any other, the number of actual suicides and would-be-suicides was growing every year.

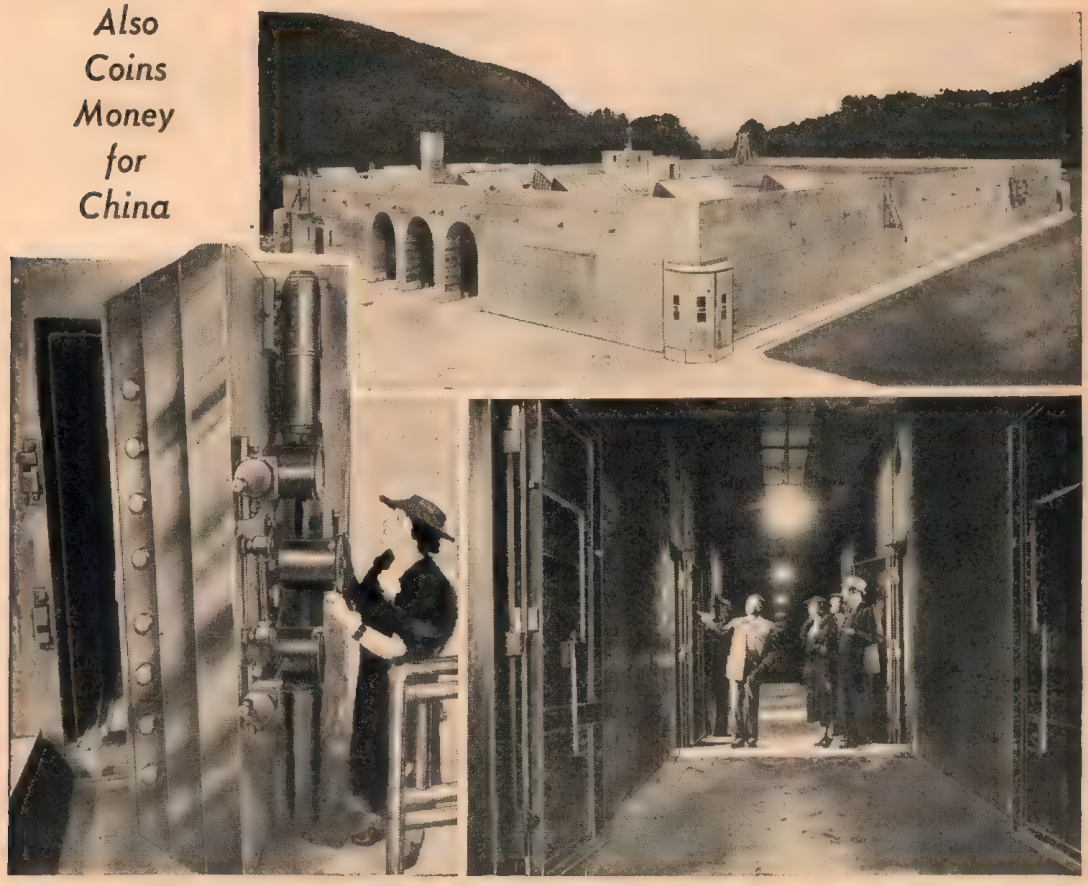
So, in order to dispel the belief that Mihara Yama is a sacred place in which suicides may find eternal rest and peace in the flames of the volcano, a Tokyo newspaper, the *Yomiuri Shimbun,* decided to sponsor a descent into the crater, and, if possible, outdo the Stromboli record of 805 feet descent into the earth made by the seismologist, Dr. A. Kerner. However, the main purpose of this hazardous expedition was to determine for all time the persisting legend that the crater was really a death-scene far more gruesome than the one depicted by Dante; that the bottom of the pit contained thousands of young lovers who had found the hot spot a real haven for their ardent love.

Two members of the staff of the paper were selected as being physically best equipped to make the dangerous exploration into the crater's bottom. Weeks of preparation were spent on various problems that might confront the intrepid newspapermen. Special

(*Continued on page* 91)

U.S. Hoards Silver in Vault

Also Coins Money for China



IF a bandit nation could foster a surprise raid on the gold and silver vaults of the United States, they would find the haul worth taking and conveniently located in a few choice spots.

At the West Point Army reservation, a new bullion depository has just been completed for the Government. Here drill-proof, flame-proof doors guard the entrance to twenty-three vaults in which 70,000 tons of silver will be stored.

Operating the press in which coins are stamped with the design; the U. S. Mint is making these silver pieces for the Chinese government.

Top—U. S. Government's new silver depository at West Point, New York.

Left—15-ton steel door guarding entrance to vault.

Right—Looking down one of the corridors of the depository, where 70,000 tons of silver will be stored.

The building itself is not very imposing, being merely a white box 252 feet long, 166 feet wide and 22 feet high. Machine gun cubicles guard all approaches.

The U. S. Mint is called upon for some strange orders. Occa-

(*Continued on page 75*).

Gun-Camera for Police

This home-owner might miss his aim but the camera will prove that the intruder was armed, ready to fight it out, and will probably allow for future identification, or even conviction.

The plain clothes man might state that the intruder was reaching for a gun the moment the shot was fired but photo would prove otherwise.

This prowler was not attempting to resist arrest at the time the photo was taken. Refer to the enlarged strip, taken with the gun camera, shown on the following page, to see how the miniature camera recorded this action.

ONE day in November, 1931, Mr. Abraham Kurnick, a news photographer, received a call from a city editor directing him to the scene of murder which had just occurred in the Hell's Kitchen regions of the West Side of New York City.

Arriving at the scene ten minutes after the receipt of the order, Kurnick, with his camera clutched in his hand, made a dive for a dingy diner in the midst of a pile of bricks and broken stones in a large empty lot close to the city incinerator.

A hasty examination disclosed that a terrible gun battle had been waged, during which the proprietor of the diner had been shot between the eyes. He was lying stone dead behind the counter with his own gun in his left hand — evidently a left handed person.

Aside from an overturned cash register, pie plates and a dozen broken dishes, the bandits had left no trace of their identity which might be of any use to the police. Meanwhile, the newsmen and the photographers were exchanging notes and cracking a few jokes about the poor marksmanship of the proprietor—but not Kurnick—this was food for thought.

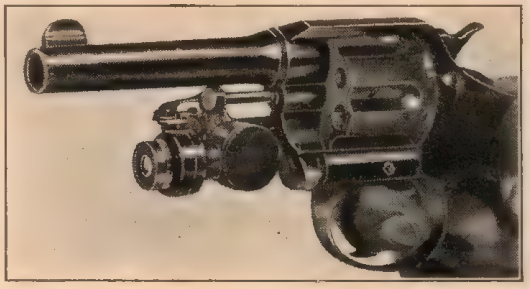
Soon after returning from his assignment, Kurnick set about perfecting a camera which actually would obtain evidence satisfactory to any court.

It has taken him almost eight

New camera, attached to pistol, will stop the criminal photographically if the lead slugs fail to do so. . . . With a speedy adoption of this camera by police departments, photographic proof could be produced to show either that the culprit was armed and resisting arrest or that the suspect was cringing from fear at the time the shot was fired.

Actual size of the pictures taken with the gun camera are shown at the left, enlargements at right.

years of hard work to perfect a device that would meet with the approval of the police and other officials connected with crime investigation. The result of these experiments is not a gadget, but a perfect device that can be adopted by the police without causing any impediment in the performance of their duty.



Right—The gun camera does not interfere with the action of the pistol. Every time the trigger is pulled, a photo is taken and the film is advanced.

In the past ten years, or more, at least a dozen camera guns have been made; few ever passed beyond the stage of "a toy." Kurnick's device, however, is so small that it does not interfere with the use of the gun nor cause an obstruction when drawn from the holster or pocket.

Right—Actual size of the camera itself as compared with a watch and below, the hexagonal film spool.

Furthermore, when attached to guns, pistols and revolvers, it provides a means of obtaining photographic evidence

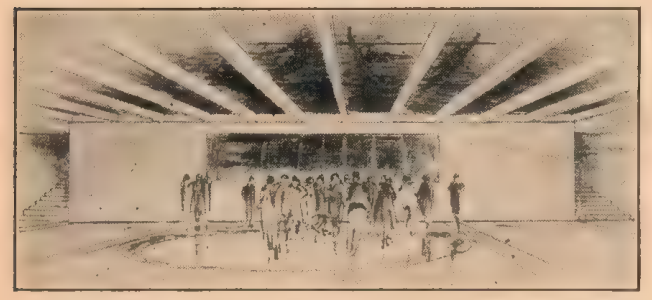
(*Continued on page* 84)

Would You Believe It?

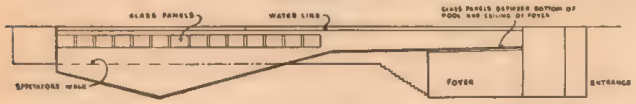
A rock-covered barge will form the replica of Old Faithful geyser located off the shore at San Francisco's World Fair. Batteries of colored searchlights will play on the water spectacle.

Old Faithful to Be "Transported" to World's Fair at San Francisco

A REPLICA of the famous geyser "Old Faithful" will be located in the yacht harbor adjourning Treasure Island, the site of the 1939 Golden Gate International Exposition. Spouting every twenty minutes, the electrically controlled artificial geyser will eject 5,000 gallons of water per minute to a height of 200 feet, with all the awe-inspiring grandeur of the Yellowstone original.



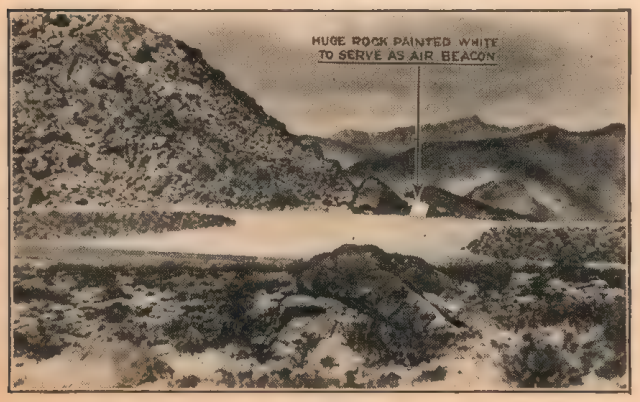
The foyer of a novel swimming pool for the 1939 Golden Gate International Exposition will enable spectators to watch the swimmers through the glass panels of the floor and walls of the pool. Tilted mirrors on the foyer walls will allow an eye-level view from below. The diagram below illustrates the construction.



Watching Swimmers from Below

THE world's most novel swimming pool is to be erected for the Golden Gate International Exposition on San Francisco Bay. Six-foot square panels of glass, one inch thick, will form the bottom of a part of the pool and similar glass panels will be installed into the sides around the deeper portions. Spectators will be permitted to watch the swimmers' movements below the water. Tilted glass mirrors will make it easy to get a bottom view of those partaking in the water sports. One of the most amazing features will be the stands and diving boards constructed of plastic glass.

Mysterious Airport Hidden on Desert



GOVERNMENT Agents have been probing the field of a strangely sinister airport found hidden among desert hills near Los Angeles, California. This flying field, distinguishable only by a huge white rock, which serves as a beacon, has a mile-long runway, a wind indicator, rock fissures camouflaged with canvas to serve as hangars and underground living quarters, with enough food to last for several months. To whom does it belong? That's what the Government would like to know!

Oddities from Many Lands

How Did It Get There?

PERCHED on what appears to be a giant cliff, is an automobile in a most precarious position. You may well wonder how it got there. The truth is that the car is a toy which was placed on top of an eroded river bank. The cliff in this photo is really about 8 feet high. The picture was taken near Brisbane, Australia.

Snow White's House

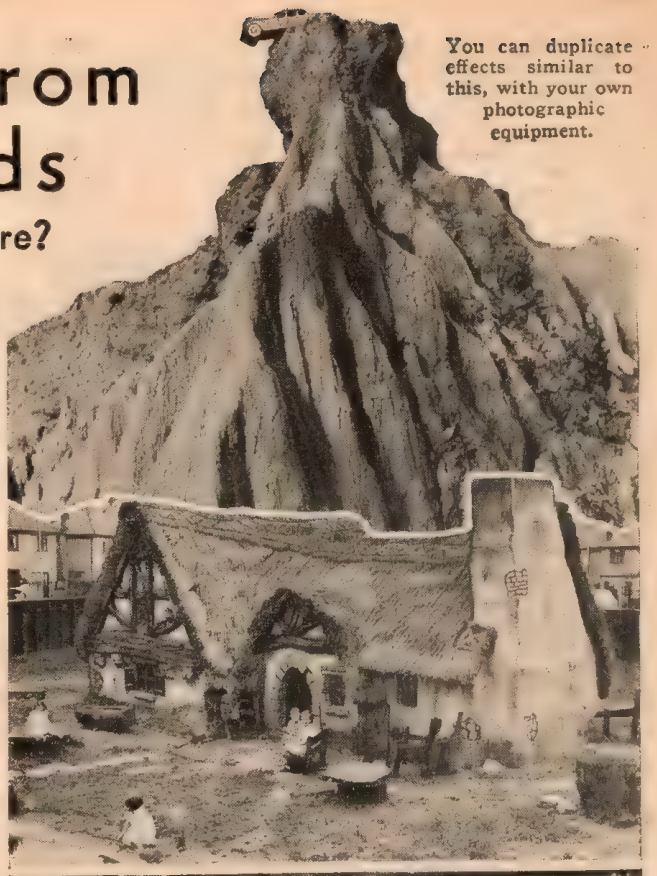
BUILT to last for some thirty years, a large version of the cottage occupied by the seven dwarfs in Walt Disney's very popular film has been constructed for the ideal home exhibition at Elm Park, Dagenham, near London, England. Youngsters are permitted to play in and around this exhibit, which will be moved to different housing estates from time to time.

Lilliputian Village

ONE of the most remarkable villages in the entire world has been erected in the gardens of the house at Bourton-on-the-Water near London, England. It is an exact scale reproduction of the pretty city, entirely made of stone. Compare the houses with the man, (Mr. C. A. Morris, its designer), walking through the streets.

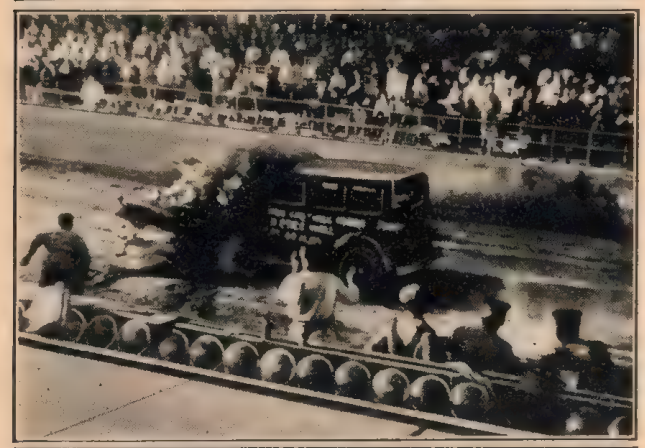
Concrete Corpses

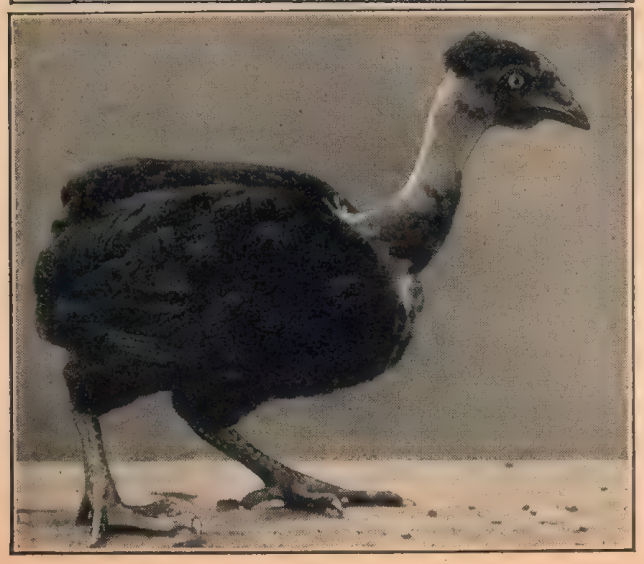
IN the Boot Hill Cemetery in Dodge City, Kansas, lie the remains of those who "died with their boots on." This cemetery bears mute evidence that the people in that town disliked crooks, and gamblers. In the foreground may be seen the decomposed head and the boots of H. T. McCarty, with his "body" covered by a thin layer of turf. But don't be shocked, the exposed parts are molded from concrete to give a realistic meaning to Boot Hill.



You can duplicate effects similar to this, with your own photographic equipment.

Photo Hickman from F.P.G.





A New Thrill Every Minute

AMERICAN audiences have become so thrill-jaded that only sure suicide will cause them to sit up an take notice. However, George Dockstader manages to get the spectators on their feet when he runs through his daredevil act. On a motorcycle, traveling at 70 miles an hour, Dockstader shoots through a 50-foot flimsily constructed gasoline saturated tunnel. Although the exposed portions of his body were well smeared with an unguent, Dockstader was slightly burned on his brief thrill journey. A blown tire, a skid, or the slightest falter of his speeding "steed," and the tunnel would have been a crematory. A few moments later, Dockstader crashed his automobile through an 18-inch solid brick wall. Even though he jumped to the back seat just before the crash, he suffered injuries and bruises enough to send him to the hospital.

Determining the Sex of Baby Chicks

NINE times out of ten, if the baby chick has a dark spot or streak on its head, it is a "she"; if unmarked, it is a "he." This system of sexing chicks was worked out by J. P. Quinn of the U. S. Department of Agriculture and is good only for the single comb Rhode Island Red breed.

Now It's "Churkeys"

THREE years ago, a turkey fertilized the eggs of a hen. The result was a half dozen "churkeys" having a body with almost double the weight of a chicken and the long neck, head and the legs of a turkey. These fowl yield larger and reportedly richer eggs. To date, there are only seven adult "churkeys" in existence.

The Home of Tomorrow!

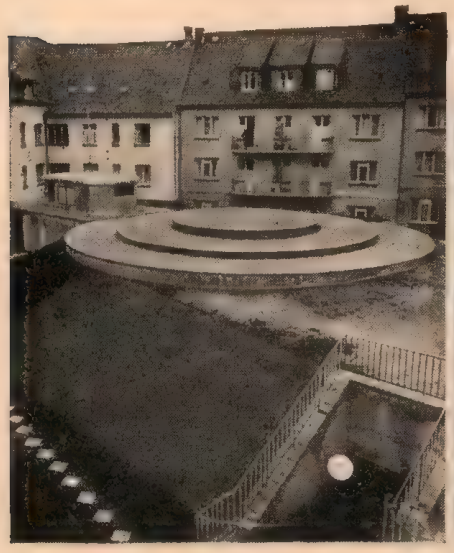
IN our February, 1938 issue, the editor of this magazine stated that man's future home would probably be an underground structure with a swimming pool on the roof. There were many reasons given for arriving at this conclusion, chief among them being that such a home could be built at a cost comparable to the expense incurred in the building of any home of similar size. But the cost of maintaining such an underground structure and of regulating the temperature both in summer and winter, was very much lower. And such a home being virtually fireproof, gas and bomb-proof, offers the most satisfactory answer to future housing problems. All of these factors are merely minor points. There are many others, too numerous to outline in this article.

Swimming pool on the roof of a garage.

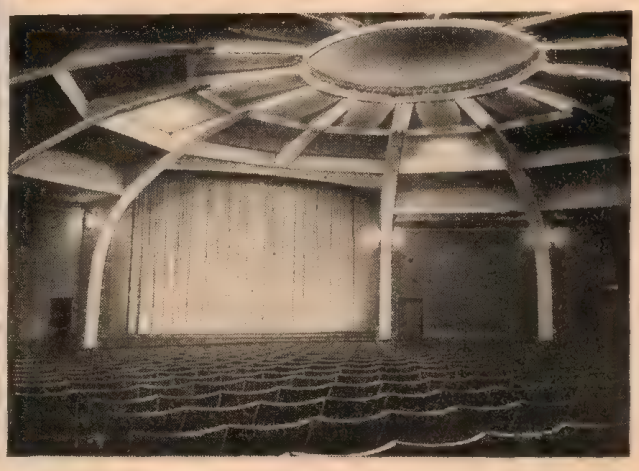
The garage measures 40 by 20 feet. The pool occupies the entire roof area.

How closely modern constructions approach the ideals suggested in the outlined article, is made apparent by the photographs on this page. In Cincinnati, Ohio, Mr. Henry Allendorf had a combination pool and four-car garage built for his wife and three sons. The pool holds six feet of water and

(*Continued on page* 71)

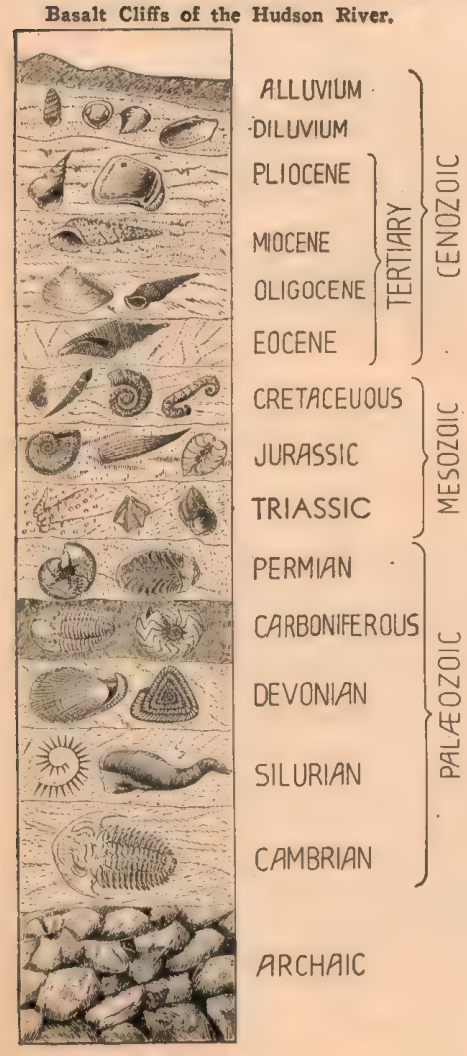


This is the entrance of the underground theatre.



The seating arrangement and stage of the newest amusement palace.

Basalt Cliffs of the Hudson River.



From the

Scientists are striving constantly to solve the riddle of the formation of the universe. Day after day, the picture is made more clear because nature left behind in the rocks many small trail markers which can be followed quite easily by those who will take the trouble to learn to read.

What this earth was like many eons ago and of what its flora and fauna consisted will be presented in this series of articles of which this is the first.

FORMED out of archaic rock, the mountain chain rises higher and higher. It was built in the early age of the earth when volcanic might was a force far greater than it is today. Other dreams of a forgotten past arise. A time when the planets were still a part of the sun. At that period, unthinkable eons ago, tiny masses of gas were torn from the orb of day by the tidal action of a wandering star that came too close. Tiny they were, as compared to the sun, but vast in spite of that. Gaseous at first, but gradually cooling to a fiery liquid and then to a molten mass, the planets were born. The heat was gradually given off into the cold of space and the substances became tougher and more solid as they congealed.

Fire and water began to fight for mastery. Cloud burst after cloud burst fell out of the air into which the fire had driven it in steam. Slowly but surely the water conquered. The fires became weaker and the condensed water collected into depressions.

Then the water began to attack the land that rose but a few feet above the level of the steaming sea. Not only is water a chemical reagent capable of dissolving minerals, but it

For those who would be interested in the names of the fossils shown at the left, the following will apply: Diluvium—1, Pupa muscorum; 2, 3, Yoldia arctica; 4 Astarte borealis. Pliocene—1, Melanoptychia gorgceixi; 2, Congeria subglobosa. Miocene—Cerithium rubiginosum. Oligocene—1, Cyrene semistriata; 2, Cerithium plicatum. Eocene — Pleurotoma cataphracta. Cretaceous — 1, Textularia striata; 2, Dentalina sulcata; 3, Crioceras duvali; 4, Ancyloceras matheronianum. Jurassic—1, Ammonites margaritatus; 2, Ichthyosaurus platydon; 3, Nucula hammeridens. Triassic—1, Brontozoum giganteum; 2, Retzia trigonella; 3, Neritopsis ornata. Permian—1, Cyclolobus oldhami; 2, Oldhamia decipiens. Carboniferous—1, Phillipsa speci; 2, Goniatites sphaericus. Devonian—1, Uncites gyrphus; 2, Clymenia paradoxa. Silurian—1, Rastrites linnei; 2, Acroculia anguis. Cambrian—Olenellus Kjerulfi. These are not drawn to scale.

Beginning

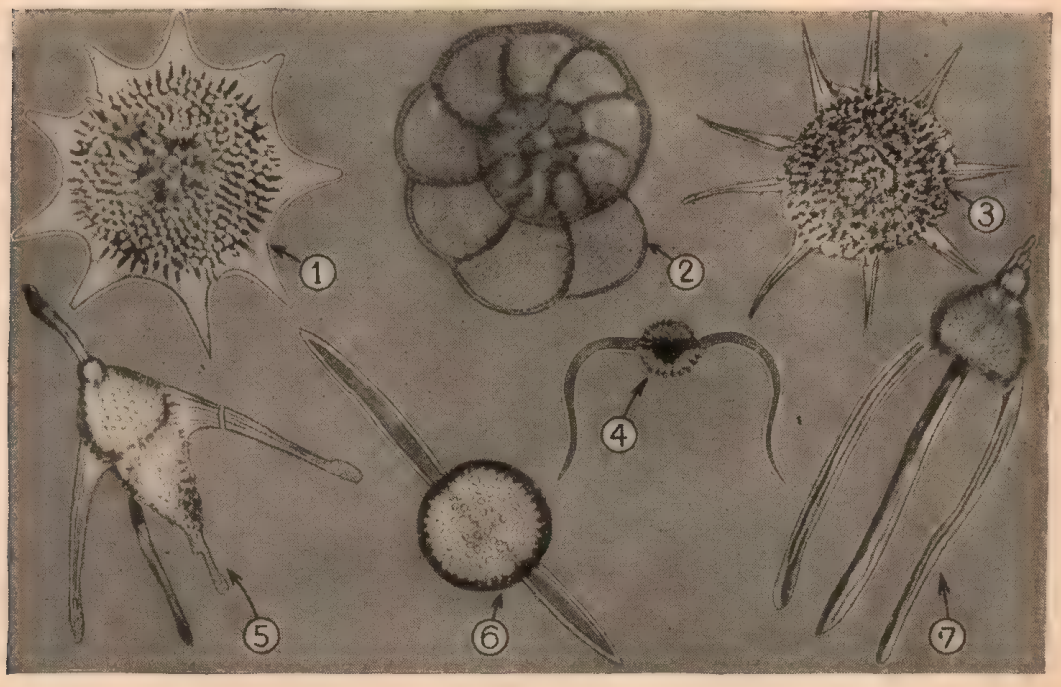
By Dr. E. Bade

Right—Dr. E. Bade, Herbert Bade, and the editor of this magazine, searching for minerals in an old quarry. Many peculiar rock formations can be seen in such places and at times even fossils are thus discovered.

also has a mechanical action that wears down rocks that lie in its path. When its work had been completed, the water returned to the air as vapor, only to start its action all over again wherever it was precipitated.

As the earth continued to cool off, the thin crust that covered it began to shrink. This lifted part of the crust and formed mountain regions. This process was slow and not accomplished suddenly. The gradual lifting was accompanied by the folding of the crust, but the solvent and eroding action of the water continued.

The earth was now divided into a thin, hard crust with a molten and fluid core. As the crust continued to thicken and the center to cool, the shrinkage thus produced formed cavities, hollows as well as faults. The internal pressure was still great and the magma (internal fluid rock), seeking to expand, intruded into



Foraminifera and radiolaria, minute organisms that were alive when the earth was young, are found just above the archaic rocks. For those who would like the names of these beautiful microscopic objects, they are—1, Heliodiscuc spec.; 2, Foraminifera; 3, Actinommadrymodes; 4, dipospyris spec.; 5, theopera cortina; 6, sethostyhis dentatus; 7, lychnocanium sigmopodium. These are all greatly magnified — more than 200 times with the exception of the foraminifera.

The eroding action of rain water goes on today even as it did when the earth was young. Material is washed down from the cliffs and mountains, rocks are worn down and the washings are carried to the ocean. The photo at the left shows the effect of rain in a clay pit. Below, Ausable Chasm from Table Rock. This shows how the river has cut through the softer rock.

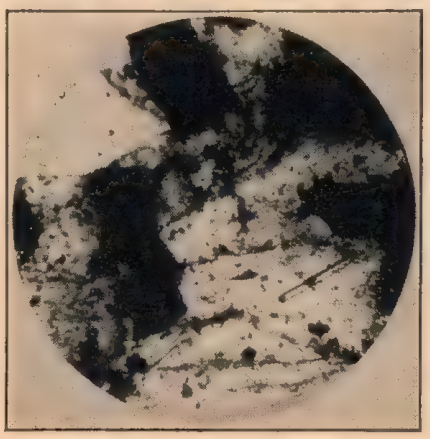
the hollows. Thin spots in the crust gave way and through the chimnies thus formed, eruptive rocks reached and covered the surface. Thus, volcanos were formed. All of these factors must be taken together as a whole in order to get a picture of the formation of ore products.

Even today it is impossible to say of what the center of the earth consists. All that is definitely known is that the temperature increases as one goes towards the center and that this temperature must be enormous. As an average, for the rise is not always uniform, the temperature goes up about 1 degree Centigrade for each 100 to 150 feet. The pressure to which rock material is exposed at the 66 mile level is equivalent to about 30,000 atmospheres. Substances in this region are in an elastic state in spite of the fact that they are as hard as steel.

The inconceivably high temperatures at the center of the earth do not affect the surface crust to any extent because the rock crust is an insulator. This poor conductivity of heat is of advantage in another way. As the sun heats the surface rocks, the heat is not absorbed, but it is given off again to the atmosphere, and heats the air, the lower levels first and finally the up-

(*Continued on page* 81)

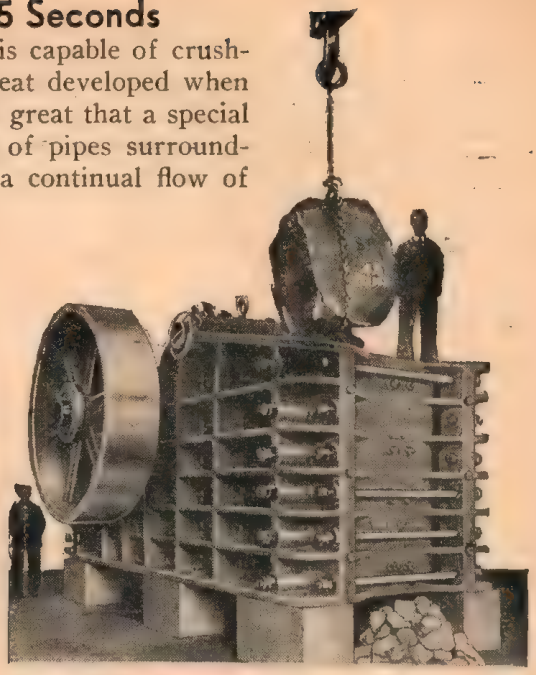
Right—Ideal section through rock strata. 1—An intrusive, coarse-grained plutonic granite which has passed through other rock strata, breaking them up; 2—Gabbro, an even-textured plutonic rock; 3—Serpentine, an altered igneous rock formation; 4—A mica schist, a metamorphic rock material; 5—Gneiss, a metamorphic rock; 6—Syenite, a light-covered rock of even texture; 7—A medium-grained light-colored granite; 8—Diorite; 9—Felsite.



Left — A sliver of granite ground down until it is thinner than tissue paper, when placed under the microscope exhibits a large crystal formation. Even the microscope has been found essential for a thorough study of the Riddle of the Universe.

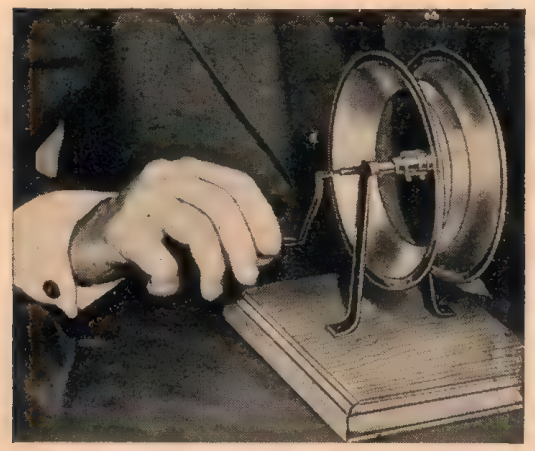
4½ Ton Stone Crushed in 75 Seconds

THIS machine, weighing over 110 tons, is capable of crushing 350 tons of stone per hour! The heat developed when this giant "coffee mill" is in operation is so great that a special cooling system was developed—consisting of pipes surrounding the upper steel casing through which a continual flow of water is circulated.



Pie Pan Drying Reel

THE "Pie Pan Drying Reel" invented by Mr. F. L. Scott of St. Louis, Mo., will keep any line in better condition. It can be made of metal or wood. The

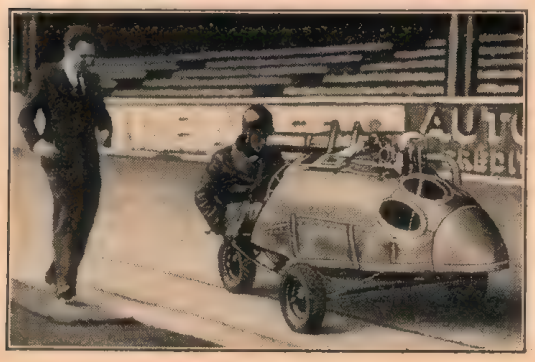


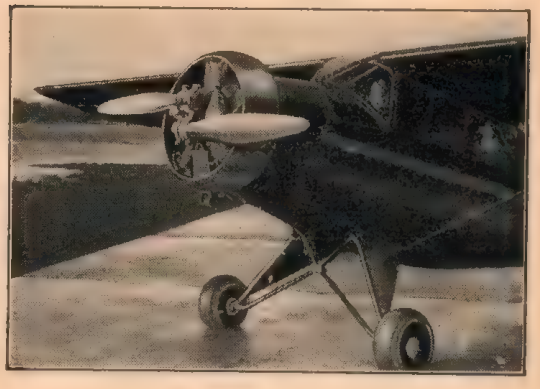
details for its construction are as follows:

Two 6" aluminum pie pans are drilled at the center and secured back to back by bushings on a piece of curtain rod bent to form—or fitted with a handle. Two metal brackets 4½" long support this above the base. For drying, the line is rewound upon this drum.

The Newest Rocket Car

VERY little information is available about the latest rocket car which has been attracting considerable attention in France. It seems as if this car has a regular compression-type engine, driving an air turbine; the expelled gases, by reaction, produce a forward motion.

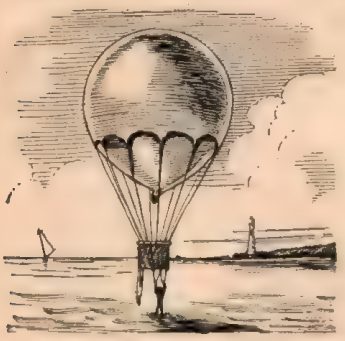




"Unbalanced" Propeller

A DISTINCT change in propeller design is that shown in the photo above. As will be observed, the blades are offset on the hub. The arc of the blades acts to bring the point of fatigue four inches closer to the hub than with conventional propellers. Because of this, greater efficiency, better balance and minimized vibration result.

Oddities of Physics

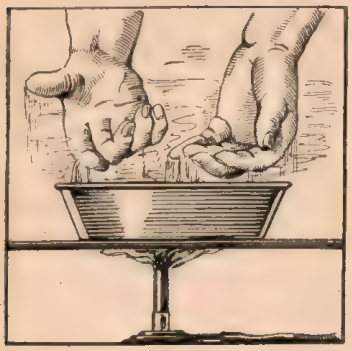


Left—An explorer hung from the basket of a rapidly descending balloon which came to rest in this position. Why wasn't the basket submerged?

NOW that an *undeclared* war is raging in China a few odd facts regarding the physics of guns would seem to be of timely interest. Did you know that there is a measurable sag in large guns such as the 12-inch coast defense or naval cannon? In range calculations, allowance for the sag of the gun barrel must be made.

The theoretical maximum elevation for a gun is an angle of 45° but in actual practice, the angle of the gun for maximum range is a little less than 45°; air resistance and other factors, require this smaller angle to give the gun its greatest range.

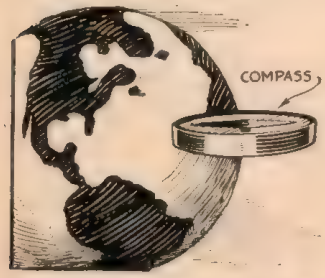
Do you know a gun, held in a vise and fired, tends to shoot wild? When the gun is held rigidly the recoil cannot be taken up in the usual manner (viz. by the gun moving backward); the result is that this energy must expend itself; it does this by creating a severe vibration in the gun barrel, hence the bullet misses its mark.



Could you wash your hands in boiling water without scalding them?

Now let us take a look at some every-day oddities of physics. *If a person looked at a woman attired first in a red dress and then in a blue dress, which would appear closer to the eye?*

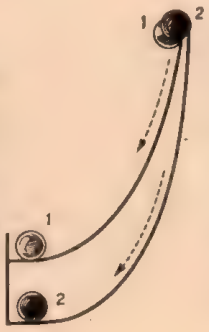
The lady in the blue dress would appear closer to the observer than would the same lady at the same distance when dressed in a red gown. This is true because the wave length of blue light is shorter than that of red light.



Is the North magnetic pole near the North Pole of the earth?

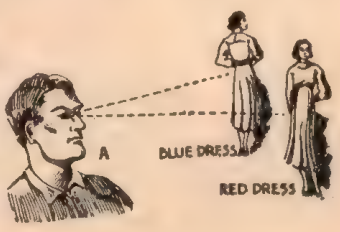
The leaning tower of Pisa in Italy has astonished thousands of travelers who have seen it. Many have questioned whether some eccentric architect of by-gone days erected this apparent freak—but such was not the case. The famous leaning tower was originally designed to be an architectural masterpiece, and was erected vertically true, just as any other building. But as the years

This aqueduct is built just strong enough to support the water. What would happen if a ship were floated in the water?



Which of these balls, released simultaneously, will arrive at its destination first?

Which appears closer to the eye? The red, or the blue dress?



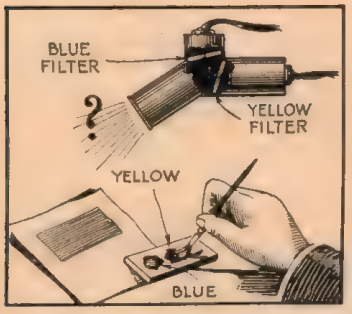
In our everyday lives are many strange and unusual facts which we look upon as rather common-place but which the physicist would single out as demonstrations of some of the laws of science.

passed, water seeping from springs beneath the tower caused the ground to soften and give way slightly under one side of the foundation. The tower leans a slight fraction of an inch more each year. One foundation engineer in New York suggested that the tower could easily be straightened with powerful hydraulic jacks and the foundation strengthened by pumping cement under the foundation through pipes placed in the ground.

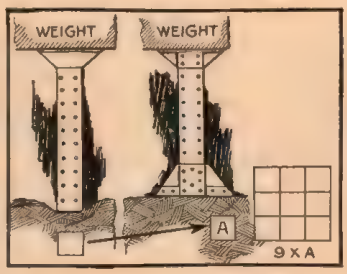
Speaking of buildings and physics, here is an interesting side-light. Many building constructors have had to learn the basic law of mechanics, that if you cannot support a certain weight with a given size of footing on the bottom of a steel girder or piece of timber, then the thing to do is to *increase the area* of this footing, as shown in the accompanying picture. In other words, if soft soil will only safely support a certain number of pounds per square foot, and if a heavy building is to be erected on such a foundation, then we should increase the area in square feet at the base of the column or columns. Once this law is kept in mind, everyday applications will pop up by the dozens. For example, did you ever notice how quickly a heavy person with small feet tires of walking or standing? The answer is that the area in square inches covered by the feet is so small that the pounds pressure per square inch is too high for comfort. You will be amazed at the great number of times this interesting mechanical law comes into your daily life.

Every art student knows that by mixing yellow and blue pigments, the resulting color is green. What color light would you expect to obtain if you likewise mixed yellow and blue beams?

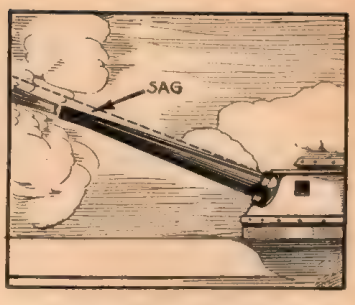
(*Continued on page* 87)



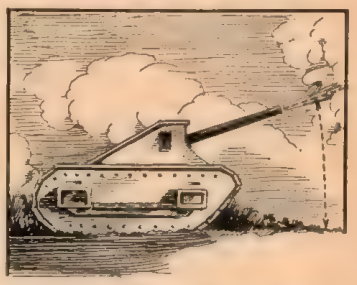
Blue and yellow colors, when mixed, produce green. What is the color of the mixture of blue and yellow lights?



This diagram shows why people with small feet tire easily.

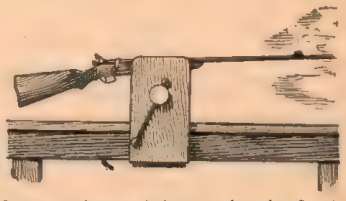


Are large calibre guns absolutely straight or do they sag?

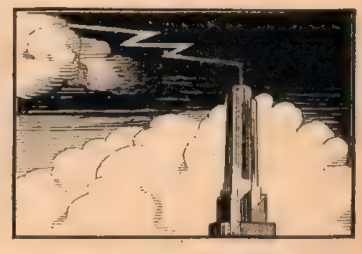


Which is the best angle of elevation for maximum range of a gun?

A tree falls on an uninhabited island. Does it make a sound?



A gun clamped in a vise is fired. Does it shoot straight?

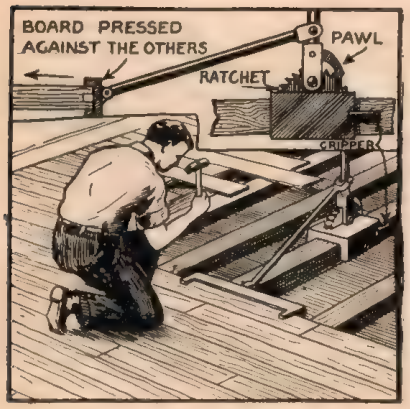


What produces the noise which follows a "lightning" discharge?

WHAT TO INVENT

By Raymond F. Yates

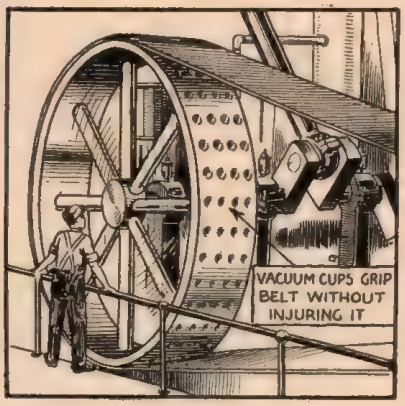
Fortunes From Needed Inventions



A much needed invention is a tool which will draw up floor boards tightly for nailing. The design illustrated would need much improvement.

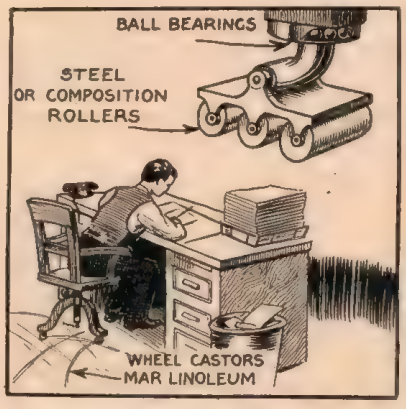
YEARS of experience with inventors have taught the writer that the average inventor too often fails simply because he does not understand the economics of invention. He knows how to invent things, but he does not know the essentials of economics behind his idea; for one thing, he doesn't seem to realize that most simple inventions must be designed so as to meet a price that is consistent with what they will do in the market that lies before them.

Still another fault is his failure to find out what has gone on before; how and in what manner other inventors attacked the problem at hand; and what should be done to spell success where others have failed. In this connection, it is to be pointed out that every problem set forth in this department has been carefully considered from this point of view. The correspondence that results indicates that many inventors lose sight of this important angle. Often readers consume months of painstaking labor, only to discover they covered ground that had been tilled by other workers. Trouble and expense often may be saved by spending a little time surveying a field before any attempt is made to perfect a new device.



Much power could be saved and a fortune could be made if some inventor would develop a non-slipping belt pulley for large or small machinery.

Carpenters have long needed a cheap and easily-applied tool to facilitate the laying of flooring; especially for sub-floors. The

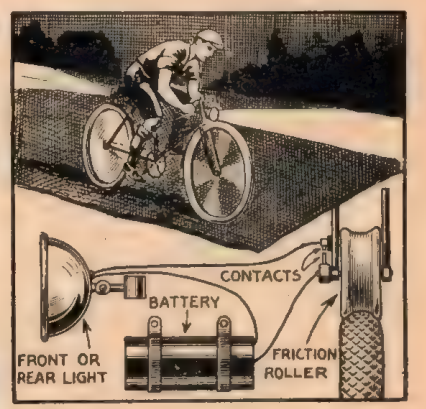


The entire weight of the person and chair rests upon four small contact points which dig into floor surfaces. A better castor is required.

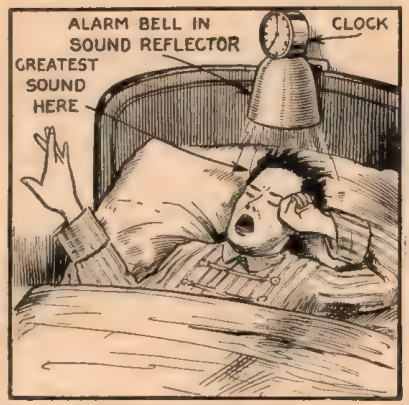
Although most housewives use pads on their tables, no one has yet developed a suitable under-the-table holder for the pads.

If you are an inventor and are able to supply the ideal solution to any one of these problems, and if you will properly exploit it, your future financial welfare will be assured.

low-grade lumber used for this purpose is always badly warped out of shape and, being of the tongue-and-groove variety, it is essential that each board be pulled into line before nails are driven. What is needed is a tool that can be clamped quickly to any rafter and that, by a lever action, would permit the worker to pull the board over with one hand and nail with the other; better yet, the tool could be set so that a board will be held in position without the use of the hand, so that the carpenter may nail it along its entire length. To be really successful, the tool should be able to do this work without smashing either the tongue or the groove. There would be no objection to the use of spurs that would sink into the surface of the wood because the first layer of flooring consists of rough boards.



The life of the bicycle lamp battery and the effectiveness of the signal could be increased greatly if an inventor developed a practical flasher.

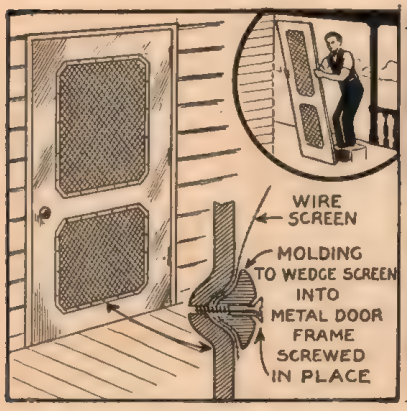


Someone should produce some sort of an individual alarm which will awaken only the person for whom the alarm is set.

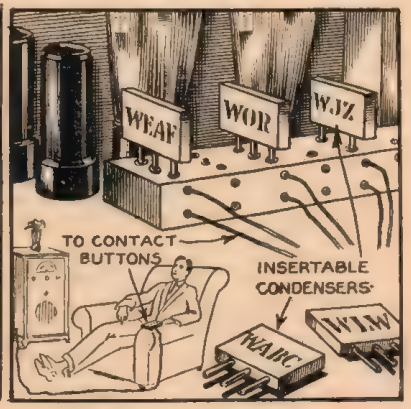
If such a tool were made so that it could also be applied to the laying of the hard wood that covers the sub-flooring, a great deal more money could be made. Here, however, the problem is quite different. There are no longer any rafters to which the device could be clamped and no marks should be left on the surface of the lumber. A combination tool which could be made to sell for three dollars, or less, would easily bring an inventor $5,000 a year in royalty for many years.

Another stickler is the problem of the non-slip machine pulley. Millions of horsepower are lost in this country annually simply be-

(*Continued on page 92*)



A steel door which could be adjusted to any size of door opening and to which screens could be attached easily would be worthwhile.



A radio set which can be tuned to any station by clock control would meet with instant favor. And how about unit condensers for push-button sets?

Candid Photography

By Herbert C. McKay

Above — Soft paper, under-exposed.

Above — Soft paper normal exposure.

WHEN you let the corner drug store do your developing and printing you usually get fair results, but when you try to do your own the result often is disappointing. Obviously the trouble does not lie in the exposure itself, and because the negative developing is so highly standardized it is probable that your negative development is as good or even better than the drug store's. So, the conclusion remains that the difficulty must lie in the printing. This is exactly the case, because most amateurs consider that the development of the negative ends all of the important work, and that prints are just knocked off automatically without giving the process any particular attention.

Almost any pictorial photographer will tell you that all he needs is a negative of average quality and from it he will produce a "show quality" print. In this simple statement lies the whole story of the difference between success and failure in amateur photographic processing. When the negative is done the picture is hardly half made, and

Below — Soft paper, over-exposed.

The amateur, interested in photography, pays entirely too little attention to the qualities of printing paper and to the details of making a sucessful print. Much of the correction needed for thin or contrasting negatives can be made during the printing process. In this article of the series, the author furnishes some helpful hints which it would be beneficial to follow.

the half which has already been done consists of selecting the subject, lighting and posing it, and not particularly in the exposure or development which is so largely mechanical. Starting with the making of the print the individual skill of the worker comes into play, and whether or not a good print is obtained has only a minor relationship to the quality of negative itself. Of course the negative which is hopelessly bad cannot be used, but a good printer will make a good print from a negative considerably below par while the average amateur will make a very poor one from a perfect negative.

Above — Hard or contrast paper, under-exposed.

Below — Hard paper, over-exposed.

Above—Hard paper, normal exposure.

It is not our intention to go into a detailed description of the printing process in this article because these details are too well known to warrant repetition. Also we may state that in speaking of printing we are including both contact printing and enlarging. All amateurs know that the process consists of exposing a piece of sensitive paper through a negative and then subjecting this paper to a process of development quite

(*Continued on page* 71)

Tricks for HOME

For filming a volcanic eruption, a small dummy set is built up as shown; nevertheless, when the story is unfolded on the screen it looks authentic.

NO matter how much money you have tied up in your home movie equipment, sooner or later you will get tired of shooting the scenery you saw on your week-end trip, such as your wife walking up to your house, and your youngster playing with your dog. Even though you may retain some interest in these all-too-prevalent trite shots, your visitors do not. It's only politeness

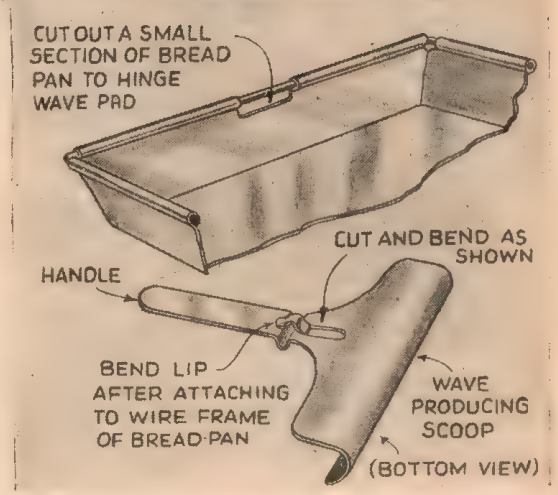
The setting is built up from a mixture of plaster of Paris and asbestos. The trees are small bits of ferns and branches of shrubs stuck into the plaster or sandy beach.

MOVIE-Makers

that keeps them from showing their boredom. Likely as not, your films do not tell a complete story; the memory of the incidents leading to your making the picture gives you the continuity, but your guests do not have the same story unfolded to them.

Why not give your friends and yourself a break by making some super-spectacles? It's easy. You don't have to burn down a city, as in "In Old Chicago," or shake the world, as in "San Francisco," to show a major catastrophe.

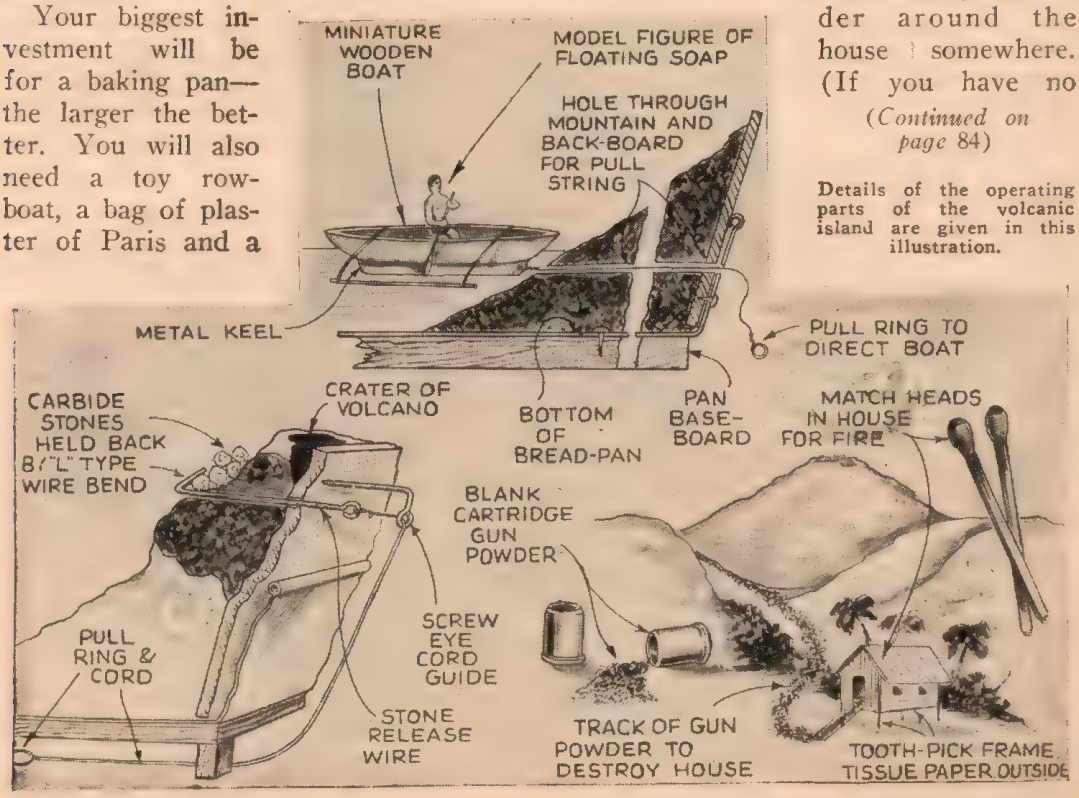
In fact, you can even show the reel "your wife took when you were wrecked on that desert island during the eruption of a volcano," without spending more than a few hours in making the props.


CUT OUT A SMALL SECTION OF BREAD PAN TO HINGE WAVE PAD
CUT AND BEND AS SHOWN
HANDLE
BEND LIP AFTER ATTACHING TO WIRE FRAME OF BREAD-PAN
WAVE PRODUCING SCOOP
(BOTTOM VIEW)

This is the equipment which is used to make the waves.

Your biggest investment will be for a baking pan—the larger the better. You will also need a toy rowboat, a bag of plaster of Paris and a bag of asbestos powder. You will probably find the necessary old newspapers, rubber bulb and tube, cigarette holder and flashlight powder around the house somewhere. (If you have no

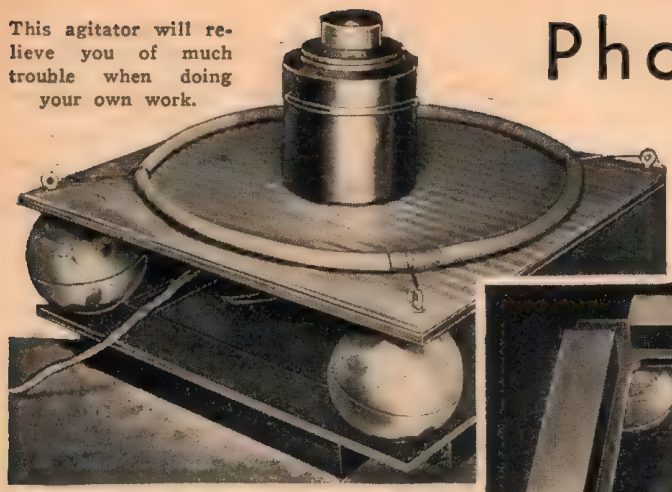
(*Continued on page 84*)


MINIATURE WOODEN BOAT
MODEL FIGURE OF FLOATING SOAP
HOLE THROUGH MOUNTAIN AND BACK-BOARD FOR PULL STRING
METAL KEEL
PULL RING TO DIRECT BOAT
CARBIDE STONES HELD BACK BY "L" TYPE WIRE BEND
CRATER OF VOLCANO
BOTTOM OF BREAD-PAN
PAN BASE-BOARD
MATCH HEADS IN HOUSE FOR FIRE
BLANK CARTRIDGE GUN POWDER
PULL RING & CORD
SCREW EYE CORD GUIDE
STONE RELEASE WIRE
TRACK OF GUN POWDER TO DESTROY HOUSE
TOOTH-PICK FRAME TISSUE PAPER OUTSIDE

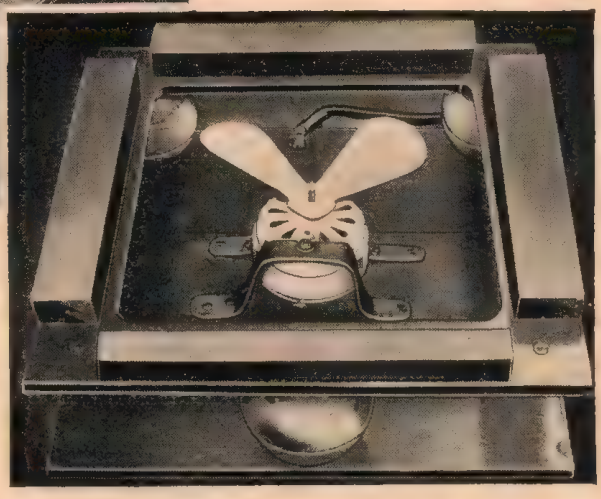
Details of the operating parts of the volcanic island are given in this illustration.

Photo Hints

Making an Electrical Agitator



This agitator will relieve you of much trouble when doing your own work.

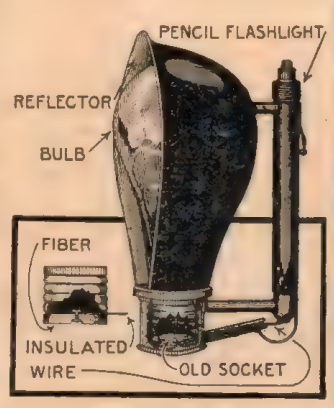


The total cost of the construction, including a new fan, amounts to only $1.65.

AMATEUR photographers know of the desirability of maintaining a developing tank in a state of agitation. To do the job right would be a tedious process but with the electrical agitator it becomes very simple. A plyboard, 12" square, has attached to its under surface a small electric fan from which two blades have been cut off. Wood screws penetrating about 1" into sponge rubber balls attach the balls to this plyboard. A piece of rubber matting is cut to size to cover the surface and is held in place by four screw-eyes which also hold a ring of rubber hose stiffened with a wire insert. The balls are also fastened with screws running into them through the lower base. To operate, set the tank on the agitator and it will vibrate and move around on the surface of the board. If the lid of the film tank does not fit tight, fasten with an "inner tube" rubber band.

Compact Flashgun and Reflector

HERE is a flashgun that occupies very little space in the camera carrying case and may be carried in the pocket. A screw socket is fitted into a discarded snuff box. A metal lamp reflector is soldered to this and a fountain pen flashlight is then attached to the reflector by three small tubes made from the handles of acid brushes. Only the "live" wire from the flashlight need be connected to the base of the socket, the other side being grounded. Make sure that all parts are well soldered; if you have the facilities, use silver solder.—JACK HONRINE.



A simple but practical flashgun.

Try These at Home

SIMPLICITY is the keynote of these helpful kinks. An old lampshade frame makes an excellent stocking drier. Just weave the wet stocking in and out through the wires of the holder and set it in place over a bulb. In a short time, the stockings will dry. If there are not enough wires, add a few more.

A SHORT fine-toothed saw, sharpened on the back edge, is excellent for slicing ham, etc. Use one edge for the meat and reverse for the bone.

ATTACHING small vacuum cups with strings to the handles of your umbrellas, as shown in the lower left photo, will enable you to hang your umbrella against any smooth surface.

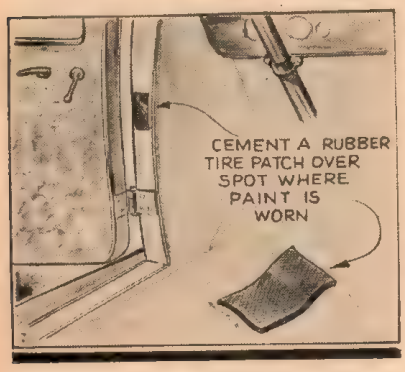
FOR bathroom use, the superiority of the home-made product shown below, will be apparent immediately. Two parallel slits are cut in the rubber bathroom mat at each end to produce a towel holder. Thus, each bather has a dry clean surface upon which to step, instead of a wet bathmat.

Practical Auto Hints

Car Door Rattles

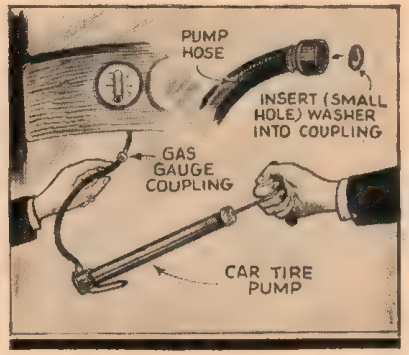
IF THE car doors of your family buggy insist on rattling and squeaking in spite of careful tightening and oiling, there is a good way to cut the noise to a minimum. Open the door and carefully examine the paint on the door edge and the side of the door frame. At any point where there is rubbing or contact of metal against metal—which causes the noise—the paint will be worn off.

Strips of tire patch cemented over the bright spots will put a layer of rubber at the points of contact.



Left — You can usually discover where doors are rattling by the polished metal spots at the contacting surfaces. Cover with rubber and the noise stops.

Right — If your liquid gas gauge refuses to function, the line may be clogged. Blow it out in the fashion shown.



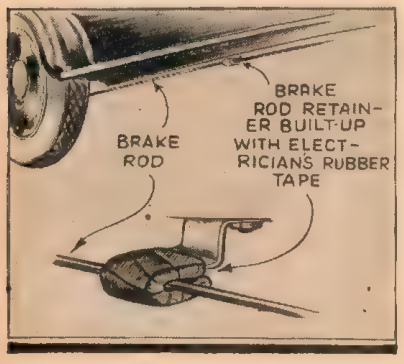
Repairing Gas Gauge

GASOLINE gauges of the "liquid column" type sometimes cease to function because a speck of dirt has lodged in the end of the small tube running from the gas tank to the gauge on the dashboard. This tube has a minute hole running through it which clogs easily.

A tire pump, equipped with a soft rubber washer as shown, usually will remove the obstruction if a few hard strokes of the pump handle are taken while holding the pump hose against the (gauge) end of the tube.

Silencing Noisy Brake Rods

SOME cars develop noisy brake rods after the first year of driving, and while correct adjustment of the rod clearances will reduce this rattling to a minimum, usually it will not cure it. The trouble is due to wearing of the rubber-lined brake rod retaining rings which, when worn, permit too much freedom of movement. A wrapping of rubber electrician's tape on the retainers will eliminate the noise for many thousands of miles of driving.



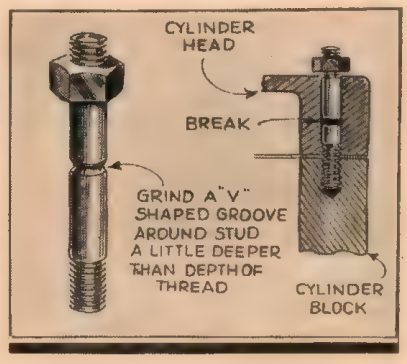
When brake rods rattle, the noise may be due to wearing of the rubber linings of the retainers. This can be fixed by the method shown at the left.

Right—When studs are prepared in this fashion, there is little chance of snapping them at the wrong places.

A Hold-Down Bolt Trick

HERE is a good safe-guard. Hold-down bolts and studs on head and manifolds break off at times because of the pressure exerted in making the motor parts tight. Usually these studs break flush with the block leaving behind a short section which is hard to remove.

A slot or groove filed in the stud, well above the line of the motor block and slightly deeper than the threads will cause the stud to break at this point first.



ALL OUTDOORS

Outboards, and Aquaplaners with Torches Produce Colorful Spectacle at Night

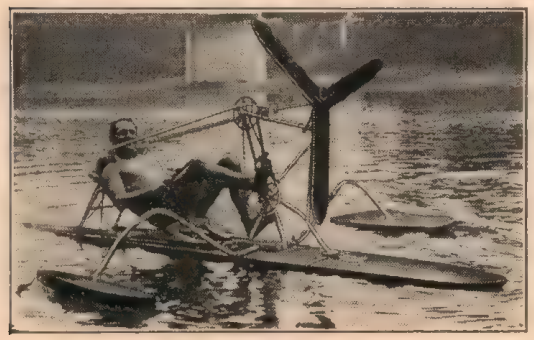
RIDING on sea - sleds, towed behind speedy outboard-powered boats, aquaplaners have introduced a new sport for the jaded and bored. While the pilots of the boats cut geometrical figures, trails of dazzling white or colored lights are left behind by torches held in the hands of the board riders. To add an element of danger to the sport, three riders then connect their sea-sleds to a speeding motorboat, as shown in this photograph. The waves in the foreground result from the backwash of the speedboat, which rushes them into the inky blackness.

Three Aquaplaners, Bill French, Miss Arnette Webster and Herbert Welsh, riding the waves in dramatic fashion behind a speedboat.

Many outboard enthusiasts in this country do not fully appreciate the possibilities their water steeds have for producing a showy spectacle. Formation runs, massing, and the cutting of capers "follow-the-leader style" by day, and with magnesium flares at night, produces as glorious a sight as any produced by a group of planes in the air. The reflections on the water greatly enhance the scenic splendor.

Aircycle Surfboard

A NOVEL arrangement of a bicycle drive coupled with a three-bladed air propellor and mounted on a surfboard balanced with two floats was built by Fred Pilates of St. Louis, Mo.



Dolly for Outboard

ARRIVING at the summer camp, one frequently finds that hauling the outboard motor down to and from the boat is a rather tedious job. If the camper will pack two small baby carriage wheels and a short rod to serve as an axle, he will have the makings of a very practical dolly. The two wheels are mounted about 6″ apart on an axle and a 3″ layer of old bagging is then wrapped around the axle and held in place with cord, tape or wire. When this has been done, outboard may be rested on the axle just behind the propeller housing and the engine can be wheeled down to the boat landing with comparative ease.

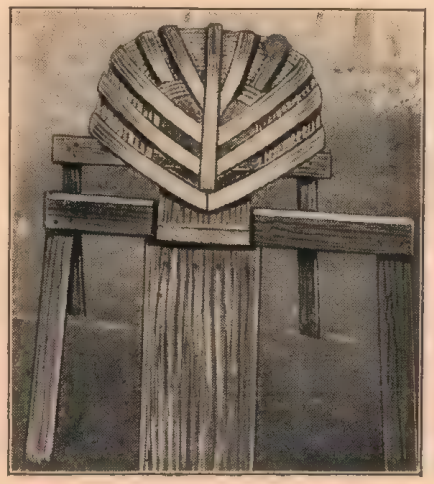
The finished racing shell will be admired greatly when tied up to the pier.

Making a One-Man Racing Shell

By Robert E. Waldron

This 14-foot craft provides good healthful exercise and may be rowed faster than a four horse-power outboard motor could push an ordinary row-boat; about ten or twelve miles per hour can be obtained.

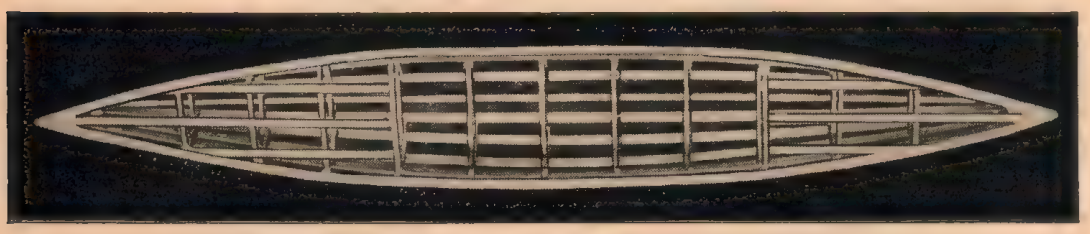
THIS rowing shell weighs about fifty pounds complete and differs from most kayaks in that the keel line is curved instead of straight and that the bottom is round instead of V-shaped. It might be added that even though it is long and narrow, being 14′ long and 2′ wide at the widest part, and possessed of a round bottom, it is quite stable; in fact, I have not turned over in it yet.



Front view of the shell with the battens in place.

The first step in the construction is to make full-sized paper patterns of the half-frames in Fig. 2. Next, make oaktag or thin cardboard patterns of each hull section and deck rib by use of the full-sized half-frames. It is advisable to make the hull sections and deck beams separately, but by use of the same half-frames, Fig. 3.

The rib patterns for all ribs except 1 and 2 should be about 2″ wide; 1 and 2 should be 2″ wide on the sides, but, due to the sharp V at the bottom, should be about 3″ wide there—Fig. 4. The rib patterns should be marked heavily or cut across at each side at their points of greatest curvature; thus making four pieces to each rib that are to be traced on the wood separately: the deck, the two sides, and the bottom, Fig. 3. Each piece now should be traced so that the grain of the wood runs lengthwise of that piece. This is necessary if the ribs are to be strong. A



The shell is ready for its guides, seat and canvas covering.

Almost every boy or girl has at some time wanted to own a fast rowing shell. This particular one may be used either as a shell with a sliding seat for one, or as a kayak paddled by two by simply removing the outriggers and sliding seat used for rowing.

Although light, the racing shell is very sea-worthy and does not tip easily. By removal of the sliding seat and outriggers, it will accommodate two passengers.

center line should be drawn on the deck and bottom pieces.

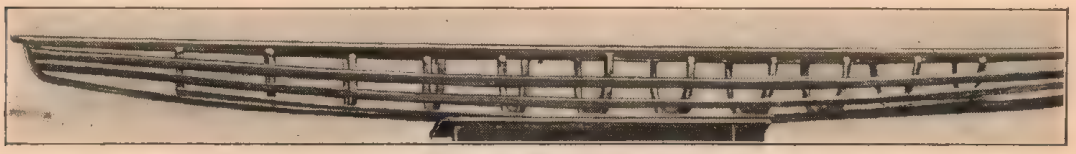
Be sure to keep in mind that there are two of every rib except No. 6. After the ribs have been traced on the wood, they may be cut out either by a jig-saw or a coping-saw. It is recommended that you number the various parts of each rib so that they will not get mixed up.

When under full headway, this craft glides gracefully and cuts through the water swiftly. A skilled user can attain a speed of 12 miles an hour.

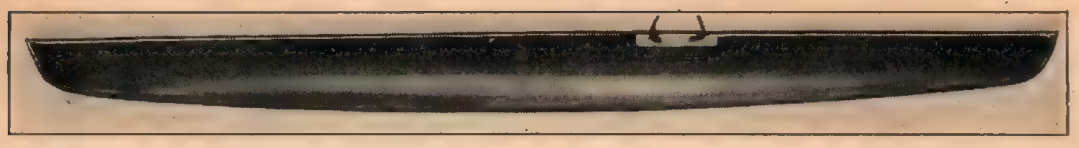
After the ribs have been cut out, they may be put together (with the exception of 1 and 2) as follows: Take the half-frame of the rib that is to be assembled and lay it on a flat board, then take the bottom piece of the corresponding wooden rib and lay it on top of the half-frame so that the center line of the bottom wooden piece coincides with the straight edge of the half-frame.

Now take one side of the desired rib and place it so that its outside curve coincides with the outside curve of the half-frame. Keeping the pieces in this position, take a strip of ½″ material about 2″ wide and of convenient length, put some good waterproof glue on it and place it over the joint, nailing it to the side and bottom pieces with 1″ copper nails for a temporary holding. Later put in four 1″ No. 6 brass wood screws and trim off the binding strip to conform with the outside curvature of the rib, Fig. 5. This is done on all the joints of ribs 2, 3, 4, 5, and 6, except where the deck beam fastens on. The deck beams are fastened across the top ends of the sides of the hull sections with two 1″ No. 6 brass screws in each end. The deck beams are lined up by the use of the half-frames (Fig. 6).

The sides and bottom of ribs 1 and 2 are fastened together differently, however. Their shape allows their sides to overlap the bottom instead of butting up against it, thus eliminating the binding strip on these two ribs (Fig. 7).



Side view of the skeleton of the racing shell. See diagrams on next page for dimensions and construction details.



After the canvas has been put in place, the shell will take on this appearance when viewed from the side.

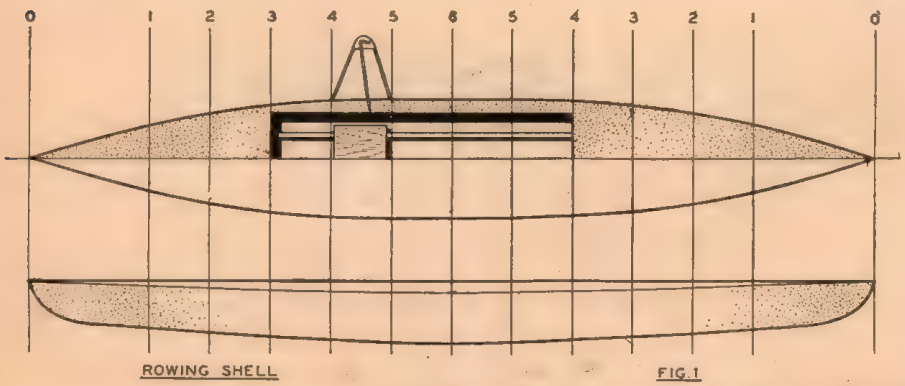
After the ribs are all put together, a ¾" deep by ½" wide notch is cut in the top corners of each rib and a 1¼" deep by ¾" wide notch is cut in the center of the bottom of the ribs (Fig. 6).

The stem pieces are now constructed from four pieces of ½" spruce as shown in Figs. 7 and 8, and a notch 4" long and 1½" deep cut in the lower ends.

The next step is to take two carpenter's horses placed about 10 feet apart and prop them up so that they are level across the top. Now place a 2" x 4" fifteen or sixteen feet long edgewise across the tops of the horses and nail it down. A straight line is now drawn down the center of the 2" x 4" by means of a chalked string stretched between two nails at each end of the 2" x 4", and plucked. Redraw this line with a pencil so that it will not fade out.

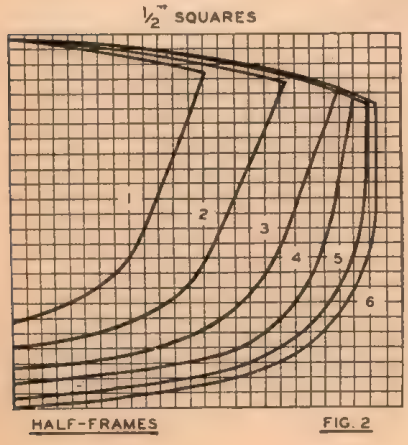
Make a point on this line near one end of the 2" x 4"; fourteen feet from this point mark another point near the other end of the 2" x 4". Two feet from each end point, make another point; now make points one foot apart all along the 2" x 4" between these two points.

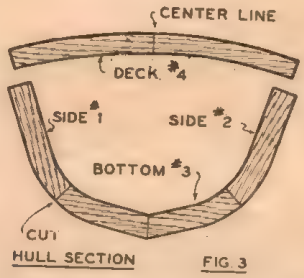
Next toe-nail rib No. 6 as in Fig. 9 to the middle point so that the center line of the deck coincides with the center line of the 2" x 4". No. 5 rib goes on each side of rib No. 6 in a similar manner, then No. 4 and so on.



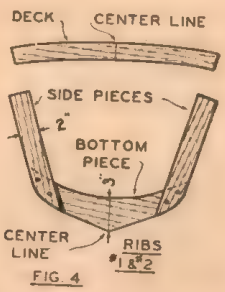
The various numbers on this pattern show where the frames are to be located. Frame patterns are given at the left.

One stem piece is grooved and notched to fit the ends of two ¾" square 16 feet long sheer pieces as shown in Fig. 10. The sheer pieces are now fas-

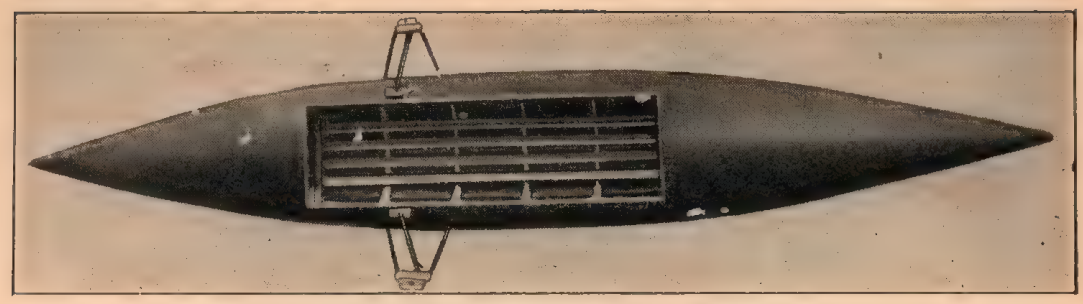




All of the ribs are made as illustrated above, with the exception of ribs 1 and 2. (Refer also to Fig. 5.)



Ribs 1 and 2 are constructed as shown here.



Top view of the shell and outriggers. Note its graceful curves, and observe duck boards in bottom to prevent user from stepping onto the canvas covering.

tened to the stem with 1½" No. 8 brass screws and marine glue.

One ¾" square 16-foot piece is also fastened in the 4" notch at the bottom of the stem piece with three 1½" No. 8 brass screws and marine glue. The stem piece is then fastened to one of the end points on the 2" x 4" and the sheer pieces and keel piece are fitted into their corresponding notches in the ribs and fastened with glue and 1½" screws.

Note: Some ribs may have to be shimmed up or cut down to smooth out the curves. This should be done as you fasten down the sheer and keel pieces.

The other stem piece is now fitted in similarly to the first one. Another ¾" square 16-foot piece is laid in glue and screwed down on top of the first keel piece.

In order to insure ease of handling and a permanent curvature, the keel is constructed in two ¾" square pieces instead of one 1½" x ¾" piece as is shown in Fig. 11.

The battens are fastened on next, 1¾" apart, at rib No. 6. They are first tacked temporarily in the middle to their proper position on rib No. 6, then they are brought down to the stem in a natural curve and tacked temporarily, their position on the stem is marked and a notch made to fit them.

(*Continued on page* 91)

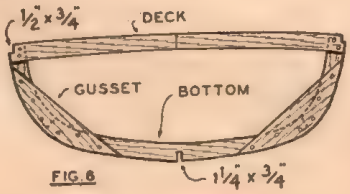


FIG. 6

FIG. 5

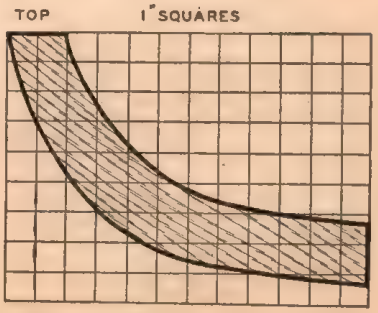


FIG. 7

The pattern for the stem pieces should be drawn to full scale before any attempt is made to cut it out. Have the grain running as shown.

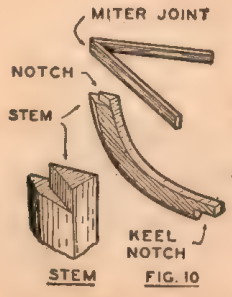


FIG. 10

When making the ribs (Fig. 3) use binding strips to connect the pieces together as shown in Fig. 5 above. Each finished rib will appear like Fig. 6.

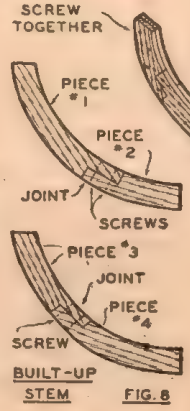


FIG. 8

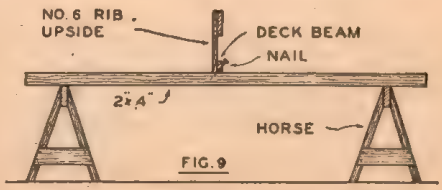


FIG. 9

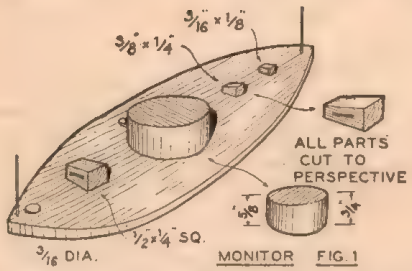
Miniature Historic

By Herbert Lozier

BEGINNING this month with the historic battle between the Merrimac and the Monitor, we present a new and different form of model. This series will not only give accurate models, but will represent them in the historic scenes for which they were famous.

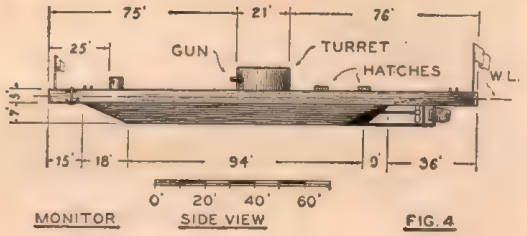
This is a reproduction of a famous painting depicting the battle between the Merrimac and the Monitor. Compare this photo with the one appearing at the top of the next page and observe the close resemblance. It should be remembered, however, that the models in the exhibit are more resplendent in their details than in the painting.

There is no need to relate the events of the battle which took place between these two boats. It is sufficient to say that they changed, in one conflict, the entire method of naval warfare. After one short encounter, wooden ships had become obsolete and the dawn



MONITOR FIG. 1

Above is a diagram showing the details of the Monitor. All of these must be distorted, as shown in Fig. 1, for the miniature exhibit.



MONITOR SIDE VIEW FIG. 4

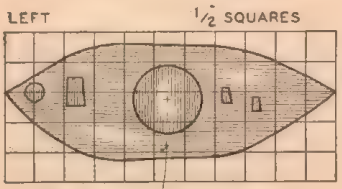
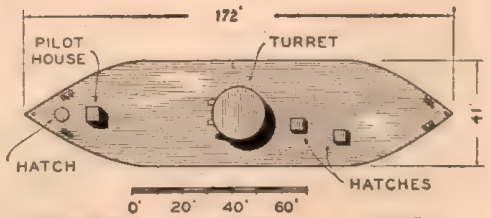


FIG 2

Again, at the left is the distortion which is necessary in the perspective model to get the effect of distance.



MONITOR DECK VIEW FIG. 5

MONITOR FIG. 3

For the museum piece here described, it is not necessary to do any work on the models below the waterline.

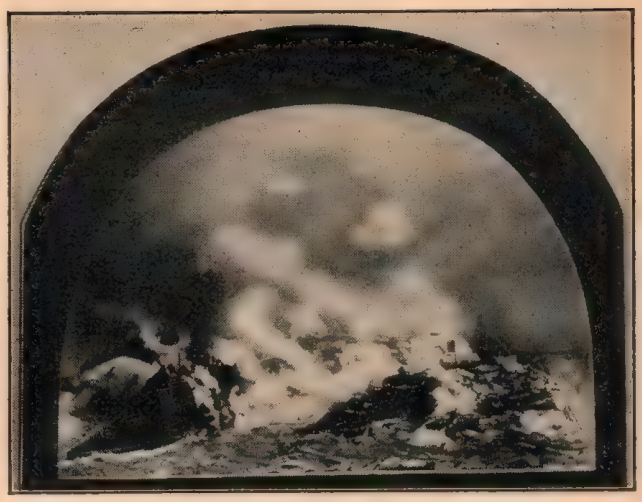
REAR VIEW

FIG 6

Exhibits

● Here is an entirely new series for the amateur craftsman. Each item in this group will depict a historic scene, with constructional details for the reproduction of the tiny models which will be outlined both in their true scale and in the perspective form which the scene demands.

Inasmuch as most of the material needed for the construction is cardboard and wood, the reproductions are inexpensive. If you follow this series, building each model as it is presented, you will have an interesting and worthwhile exhibit.

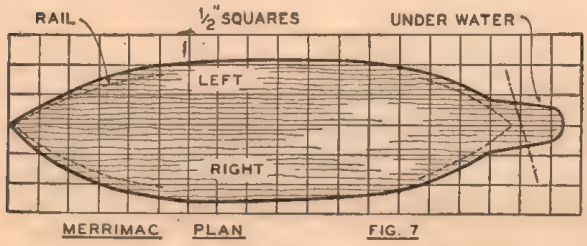


This is the appearance our miniature historic exhibit will give when finished. The clouds of cotton smoke may be darkened by blowing carbon or charcoal scrapings onto them.

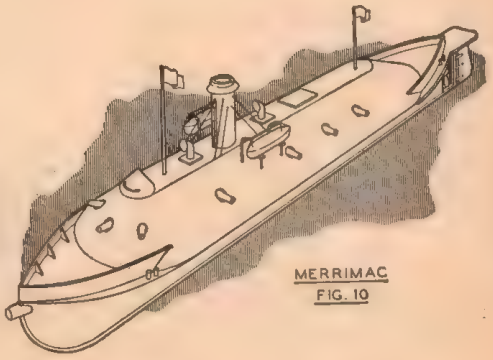
of the iron ship had come. Yet, it seems strange that these two odd craft should be the fore-runners of our great modern battleships.

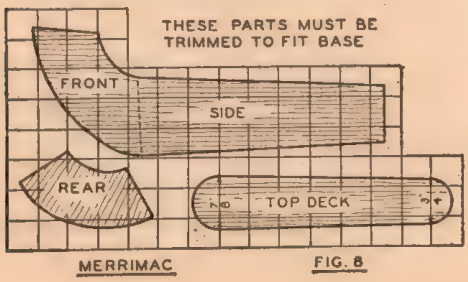
There is one error in most of the descriptions of these boats. They refer to them as the first iron-clads. But the Merrimac was not completely iron, as you may be led to believe. She was wood below the water line and only her sloping sides and decks were of metal. The Monitor was really a *different* boat—the clever conception of John Ericsson.

For our purposes, the models of the ships may be built of cardboard or wood. The water is plaster of Paris on a wood base. The background is painted on a quarter sphere made of papier-mache. Cotton is used for smoke and ordinary

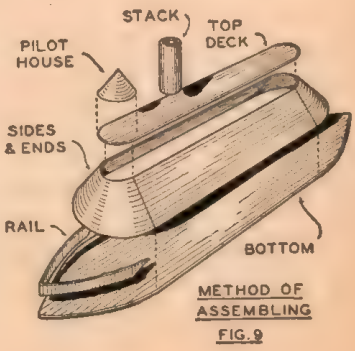


This is the way the base on the model must be changed to give the impression of the proper perspective. Do not use this plan if you intend to build a true scale model.

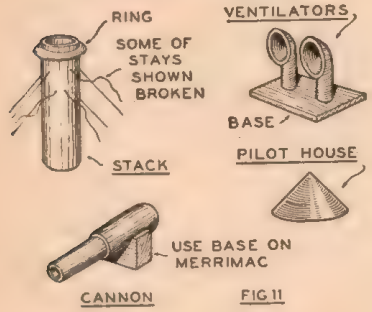


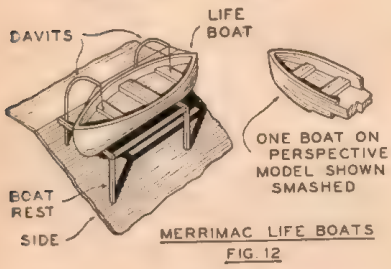


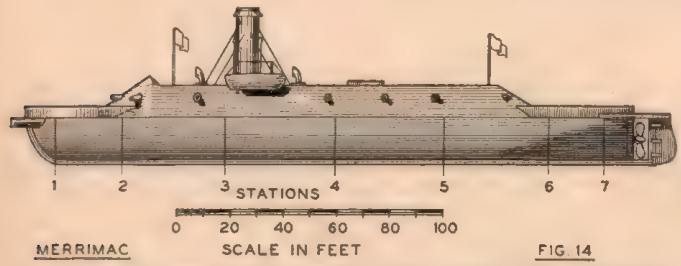
The accompanying diagrams show the constructions of the model of the Merrimac. For the cyclorama model, it is not necessary to do any work below the water line as this portion would have to be embedded in the plaster of Paris waves. No carving is necessary to produce such waves. They are merely blown into the hardening plaster.



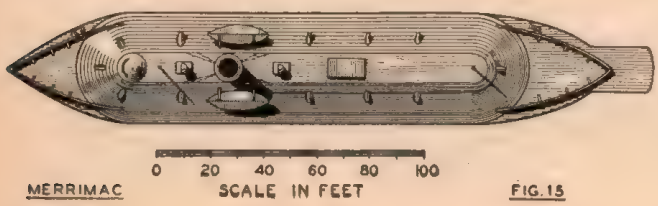
Gluing the "smoke" in place on the miniature historic exhibit.







For those who would like to build a scale model of the Merrimac, these two diagrams will serve for the details. Remember, however, that for the perspective exhibit, the shape will have to be changed considerably.



paint, blended with a few oil colors, produces the scenic effects.

Let us begin with the Monitor, Fig. 1. She is an extremely simple affair. The plans, Fig. 2, are given for a cardboard model, though wood may be used in its place. In the event that cardboard is used, the hull is built up to a thickness of 3/16″ by gluing layers of cardboard on top of one another. If very thick cardboard is used, no more than three or four layers are required. Simply glue the layers together and place a weight on them. After they have dried thoroughly sandpaper the edges and taper the bottom so that the hull is 1/16″ thinner at the rear, or measures ⅛″ there.

Remember that the hull and all the fittings on both models are carved to "perspective," that is, they get smaller as they recede from view, Fig. 3, the more distant the part the smaller it appears; therefore the hulls and fittings will be purposely distorted in various places. (This does not apply to the scale models for which accurate plans are included; see Figs. 4, 5, and 6.)

A single piece of pine or balsa wood may be used in place of the cardboard for the hull. However, it should be sanded down at the rear to the measurements given above. The hull is 1⅞″ wide.

The turret is a section of broom-stick handle cut off ¾″ high. It is about 1⅛″ in diameter. Sandpaper the top down so that one side is about ⅛″ lower than the other (see the plan). Then drill an ⅛″ hole in the turret to receive the gun.

The fittings are all made of balsa wood lengths, ¼″ and ⅛″ square. They are trimmed down to perspective, as shown on the plan. There are three wooden deckhouses. One in front of the turret near the bow, and two behind the turret. Be sure that they all decrease in height and width as they approach the rear. A small disc of cardboard is glued at the bow in front of the first "house"; it is about ⅜″ in diameter.

The flagpole is a piece of bamboo 1/16″ square, rounded with sandpaper and glued into a pinhole at the

rear of the hull. Make it about 1" high. The Civil War flag of the U. S. government flies from this pole. It should be painted on paper or very thin cloth. Two cannon balls are glued to the deck. These are small beads glued in place and painted silver.

The boat is painted a very dark gray at the front, gradually blending to a light gray at the rear of the boat and turret, and then to a dark gray at the opposite side (left side looking from the front).

The scale model of the Monitor (Figs. 4, 5 and 6) is built up in the usual way. Either a solid block or lifts may be used to form the hull below the water line. The deck is a flat board of the correct thickness. There are two cannons in the turret and four bits, placed two in the front and two in the rear. The hatches and forward "house" are built of wood. The propeller and cannons are best purchased (see the plan for correct proportions). Remember that the scale plans are *not suited* for the model in the scene, though detail may be taken from them. The scale plan is given for those who want to build the models separately and not put them into a cyclorama.

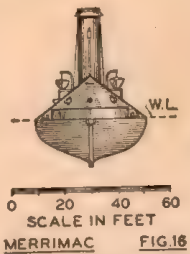
Now the Merrimac is started. For the perspective model, cardboard should be used. The patterns are given in Figs. 7 and 8. Cut out the parts carefully and pin them together until they are dry.

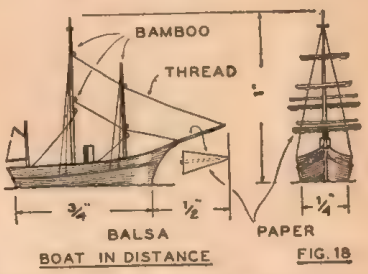
The various parts are cemented together as shown on the general assembly sketches, Figs. 9 and 10. If any of the parts do not fit perfectly, as some will not, due to the fact that all will not be made of the same cardboard, trim them where necessary and then glue.

Use a stiff cardboard for the flat bottom (hull) and a smooth pliable kind for the top.

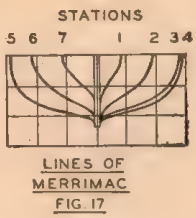
(*Continued on page* 85)

Note that every straight line on the model runs to a vanishing point. This statement is equally true of horizonal lines.

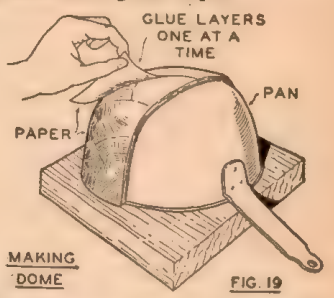




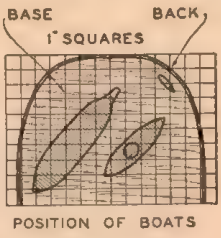
The small boat in the distance in our historic exhibit creates the impression of great depth.



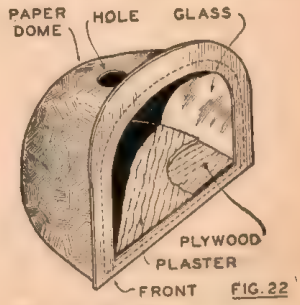
These curves are drawn to twice the scale of Fig. 14 and 15.



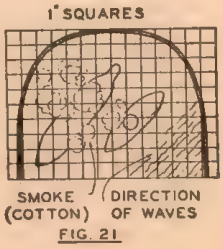
Any suitable bowl or pot can be used as a mold for the cyclorama.



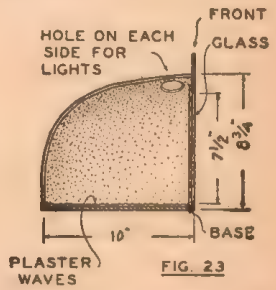
Care should be taken to locate the boats properly. This diagram gives the position.



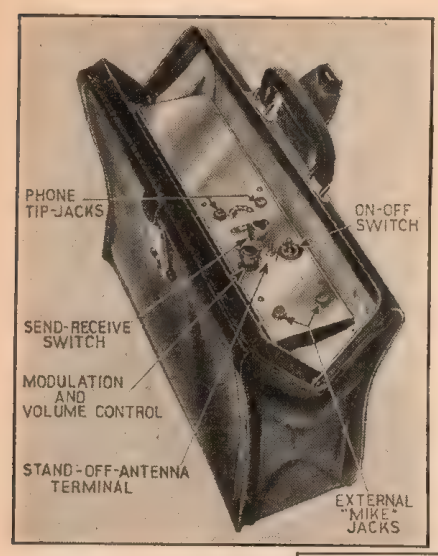
This shows the assembly of the complete small stage.



Waves, smoke and flags point in the same direction.



Cross-section through our miniature stage, showing its construction.

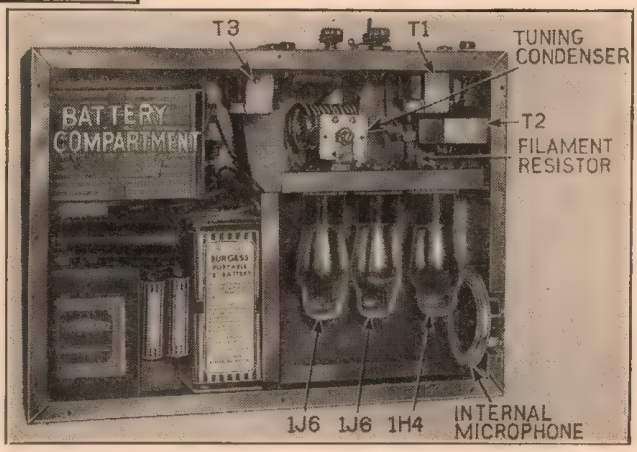


The controls for the transceiver fitted into a brief case are all at the top and easy to reach. All of the parts are marked in this photograph.

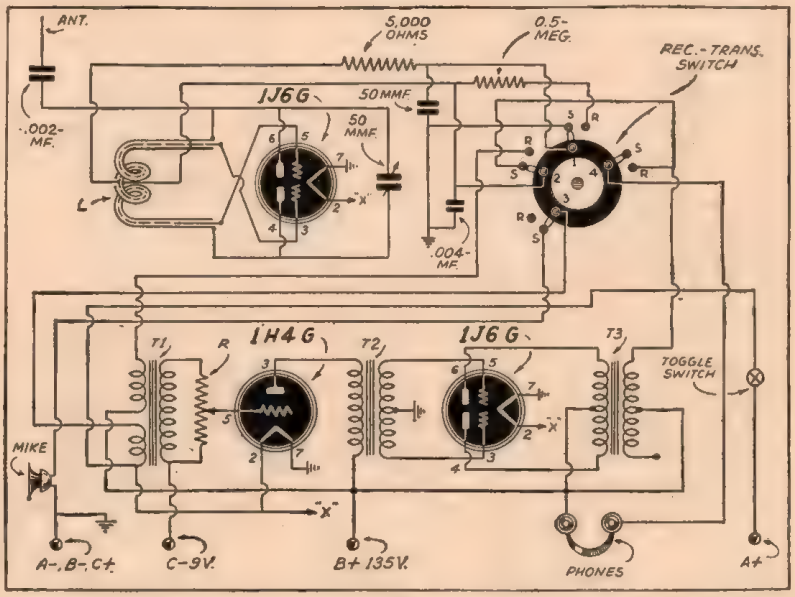
Constructing an *Emergency Brief Case* Transceiver

By J. T. Bernsley

SOME time ago this magazine described the construction of a brief-case receiver, intended for broadcast listeners who desired a portable set that might be carried freely without being too conspicuous. It was so well received that it was deemed advisable to construct a transmitter - receiver for that class of radiomen who are known as "amateurs." However, this unit is also recommended for commercial applications wherever instant and reliable two-way communication is desired. Its radiophone range conservatively is over 10 miles, and in a good



Left — From this photo, it will be observed that everything fits compactly within a metal box which will slide into a brief case. By means of the internal microphone, it becomes possible to pick up a conversation and transmit it while the person being interviewed is entirely unaware of what is happening.



For those familiar with radio circuits, this schematic diagram can be followed easily. However, those who do not keep abreast of the new tubes and sockets will appreciate the pictorial diagram on the next page.

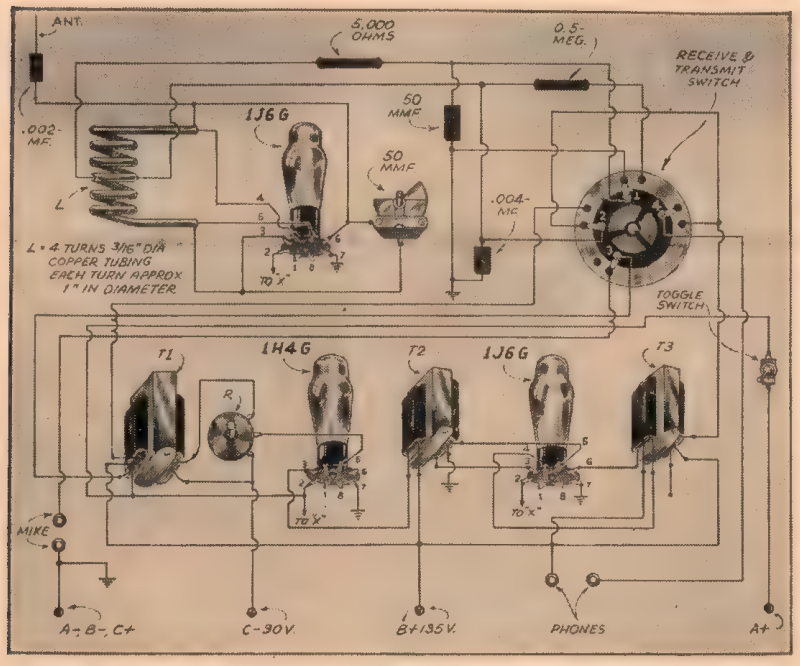
A complete 5-meter transmitter and receiver, within a shielded housing containing all batteries, tubes and parts, arranged so that the unit may be inserted easily into any average brief-case. It is intended for amateur use, or commercial application, such as for pleasure craft in times of emergency; or for hunters and explorers on remote inland trips, military applications, detective work, etc. It must be emphasized that a government license is essential to operate this unit as a transmitter.

A hand telephone-type set enables the operator to carry on a two-way conversation via the brief case.

location with proper antenna or radiating system may easily reach 50 miles.

It is not absolutely essential that the chassis or frame of this unit be installed in a brief-case, even though it is shown in that manner in this article. The chassis, complete with batteries and tubes, less brief-case, weighs slightly less than 11 pounds, and may be just as easily installed in a car, airplane, trailer, boat, or even carried about without any other casing, except perhaps for a handle, and without any other accessories—since everything (but microphone and phones) is contained within the unit. Its portability and compactness is well illustrated in the photographs.

All operating controls are accessible from the top, and have been kept down to a minimum to simplify operation. As a matter of fact, after the instrument is adjusted, the operation of the transceiver is confined to just two controls, the "on-off" switch and the small black knob which changes the unit from a transmitter to a receiver. The other knob control regulates the audio component, which adjusts the volume when in the "receive" position; or the degree of audio modulation when in the "transmit" position. There is no need for constant manipulation of this control, once the desired volume and audio modulation is

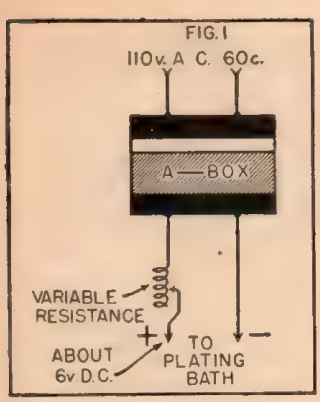


This diagram clarifies and simplifies the wiring for the uninitiated. Remember that any loop in a crossing wire illustrates a jumper and not a connection.

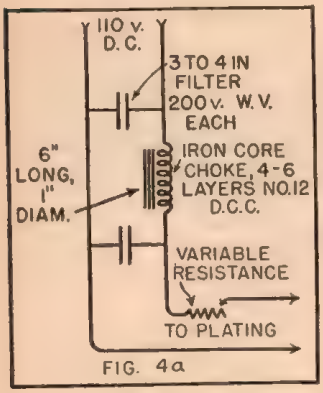
(*Cont. on page* 94)

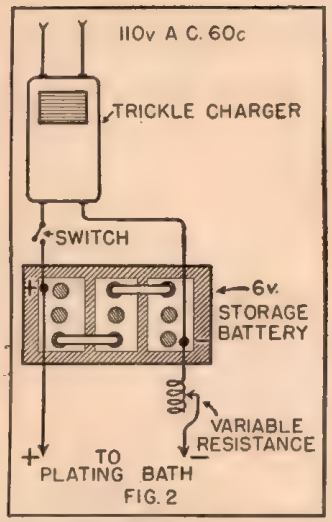
Electroplating

The first principles in electroplating, and the method of setting up the equipment for doing this work, are given in this article.

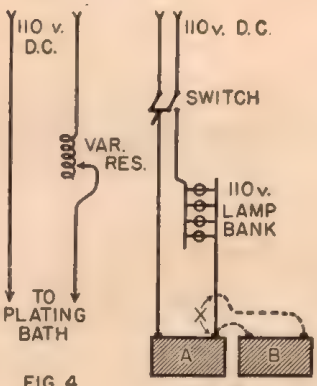


An excellent method of obtaining current for electroplating is in the form of an "A-box"—the "A battery eliminator" which was used for converting battery radio sets for operation on 110 A.C. supply.

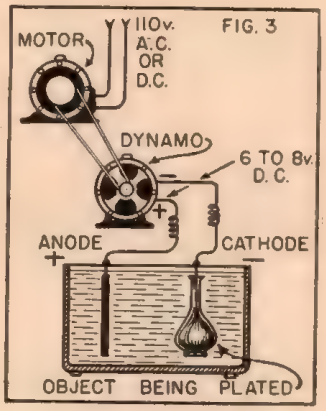




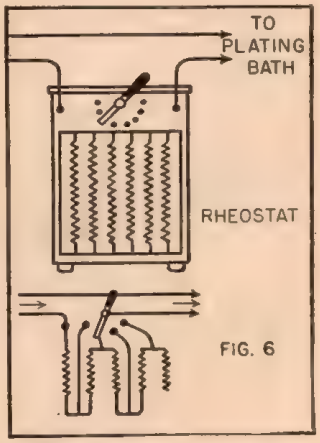
A storage battery is a good source of current supply. The usual trickle charger will keep it charged, but should be disconnected when plating. Left—When using direct current, it is advisable to employ a filter as shown.



When using direct current for plating, a variable resistor as illustrated in Fig. 4 may be employed. A better way is to use the current to charge storage batteries, as shown in Fig. 5. When two storage batteries are to be charged, connect as shown by the dotted lines and cut out the wire jumper X.



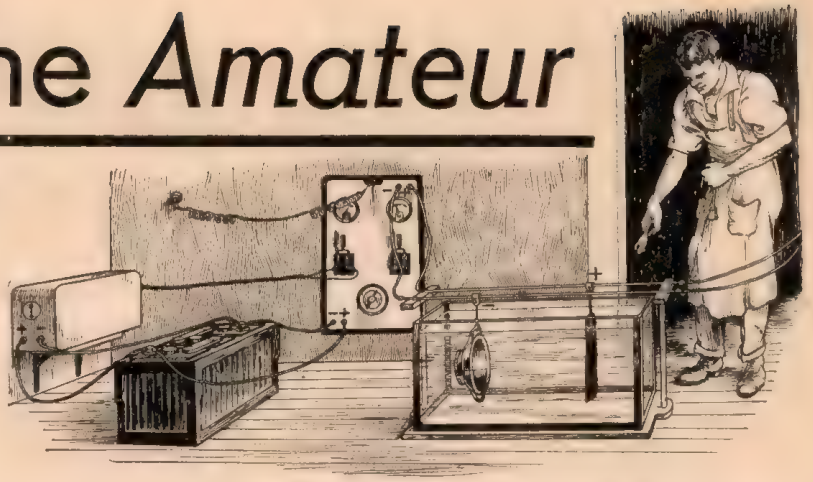
A small dynamo may be used to furnish current for electroplating and the apparatus is then connected as shown. Other sources of power could be substituted for the electric motor.



Method of making a rheostat for controlling the current is illustrated here. See further details in Fig. 6A.

FOR the home electroplating shop, which may be located in the basement, cellar, or in the corner of the garage, there are a number of different sources of direct-current supply. For plating nickel and other ordinary metals a voltage of 3 to 6, D.C., is required. One source of this low-voltage D.C. for plating baths is one of the radio "A boxes" which once were employed to operate 6-volt battery sets from 110-volt A.C. circuits. Another source of 6- to 7-volt D.C. for plating is to use a 6-volt storage battery connected with a trickle-charger as shown in Fig. 2. It is advisable to open the switch be-

For the *Amateur*

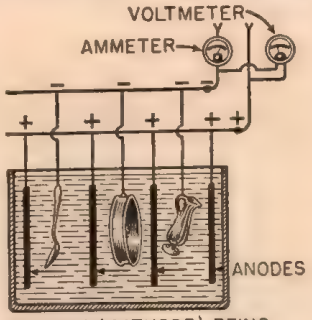


A simple electroplating set-up is illustrated above. It is preferable, however, to use an all-glass or porcelain tank without metal corners.

tween the battery and the trickle-charger when plating, to avoid any pulsation in the current supplied to the plating tank.

Still another source of 6- to 8-volt D.C. for electroplating is shown in Fig. 3; here a low-voltage D.C. dynamo is driven by a 110-volt A.C. or D.C. motor (or it may be driven by a small water motor or gasoline engine). Fig. 4 shows how low-voltage D.C. may be taken from 110-volt D.C. circuit through a variable resistance or a lamp bank. The current in this case is liable to have a noticeable ripple, however; and it may be necessary, for plating purposes, to connect a filter made of condensers and a choke, in the output side of the circuit (See Fig. 4a). In Fig. 5 is shown a method of charging one or more 6-volt storage batteries through a lamp bank connected in series with 110-volt D.C. Fig. 6 shows how to make a rheostat, comprising a series of coils of iron or resistance wire, such as German silver, and a switch for cutting in more or less resistance. Usually an ammeter and a voltmeter are connected to the plating tank circuit, as shown in Fig. 7. For small plating tanks, the current

(*Continued on page 78*)



OBJECTS (CATHODE) BEING PLATED IN GLASS OR EARTHENWARE TANK

FIG 7

Meters should be connected into the circuit as shown, so that the amount of current may be measured.

Left—For more serious work it is advisable to keep the plating solution in motion.

Buffing wheels, as illustrated at the right, will be necessary for cleaning and polishing.

Below — Any article being dipped in a caustic bath should be handled with tongs.

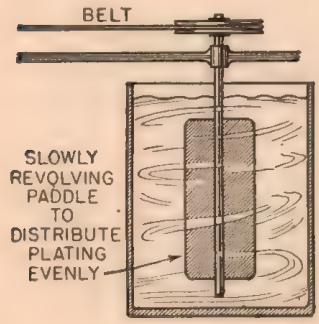
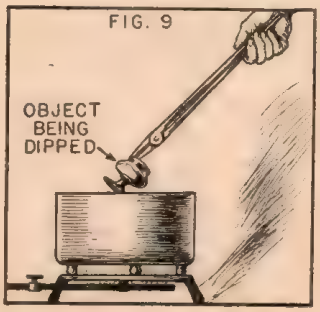


FIG 8



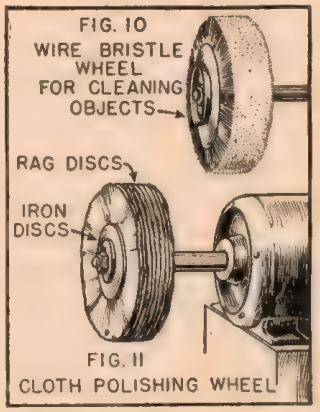


FIG. 11
CLOTH POLISHING WHEEL

LATHE HINTS

BY JOSEPH

This month the author describes how to make a simple centre indicator; how to drill balls; make chains for models; convert grease cups to oil cups and offers some valuable pointers for the use of files at the metal cutting lathe.

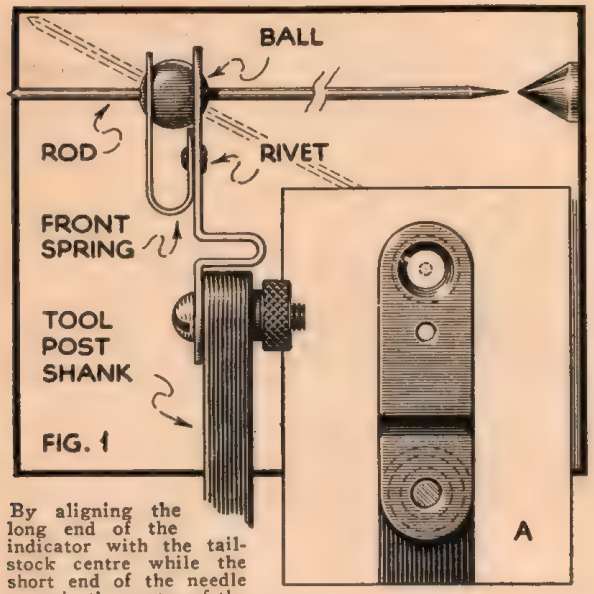


FIG. 1

By aligning the long end of the indicator with the tail-stock centre while the short end of the needle rests in the centre of the work, the amount the work is off center can be determined with rapidity and precision.

A PRACTICAL type of testing device is depicted in Fig. 1, which, because of its utility and ease of construction, should be added to the generally limited measuring and testing equipment of the average lathe owner. This is a center indicator or "jigger"; it is mounted in the lathe tool post and the shorter end of its indicating rod is pressed into a center punch mark or hole in the work piece. Since the fulcrum or ball of the tester is so located that the free or indicating end of the lever rod is approximately ten or more times as long as its work end, variations off center of the work of even less than a thousandth of an inch are easily perceptible. Obviously, such a device or its equivalent is practically indispensable in face-plate work.

Constructional details of this tool are apparent in Fig. 1, wherein the indicating rod shown is simply a steel crocheting needle forced or pinned in the ball and properly pointed at its respective ends. Such needles are available in sizes varying from 1/10" to ⅛" in diameter and from 10" to 14" long. Ordinarily, drilling a steel ball for this purpose might offer some difficulty, but by constructing the lamp detailed in Fig. 2, the operation is rendered as easy as flat drilling. This clamp consists of a heavier base member which is drilled with face-plate clamp screw holes as shown. The center hole is countersunk to a 90° taper and thus enables a spherical member to be seated properly. A corresponding taper hole is also bored in the strap or upper member of the clamp unit. Drilling of the ball is done through this upper hole. After mounting the ball and center-punching it, the clamp is mounted on the lathe face-plate or it can be held on the drill

The jig, shown below and easily made, allows for the rapid drilling of two holes partly into or entirely through balls.

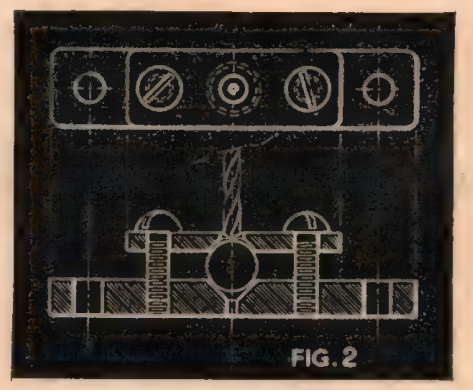


FIG. 2

and ODD KINKS

PIGNONE

press table for drilling. One or two additional steel balls of different diameters can be partially drilled at the same time. These are later used to slip over the work end of the indicating rod to enable the tool to be used against large holes in the work.

Although chains for model work are available at low cost, a method of making them as suggested in Fig. 3 is offered to those exacting model makers who insist on faithful reproduction and absolute scale measurements throughout their models. A steel mandrel whose cross-section is shaped exactly to link form is used for this purpose. Soft or annealed wire of the proper diameter is wound tightly and closely over this and every turn of the coil later becomes a link of the chain. The wire wound mandrel is then clamped between two hard-wood blocks and the coil is sawed lengthwise, preferably with a very thin circular saw mounted in a hand motor tool. The saw cut will result in a chain link which is slightly narrower at one end. If this is objectionable, or if the available saw is too thick, the steel mandrel can be filed and shaped to allow for the width of the saw cut. Unscored and clean assembly of chain links is best assured by the use of two pairs of smooth jaw pliers.

Many model enthusiasts prefer to make chains so that they can obtain true-to-scale reproductions. The method disclosed makes this easy.

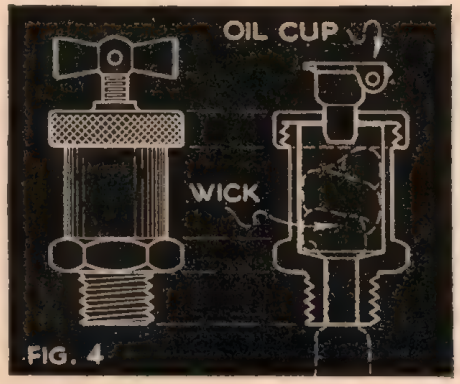
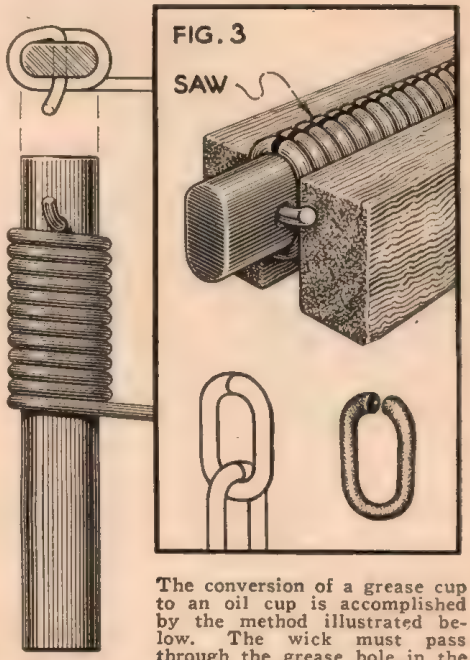


FIG. 4

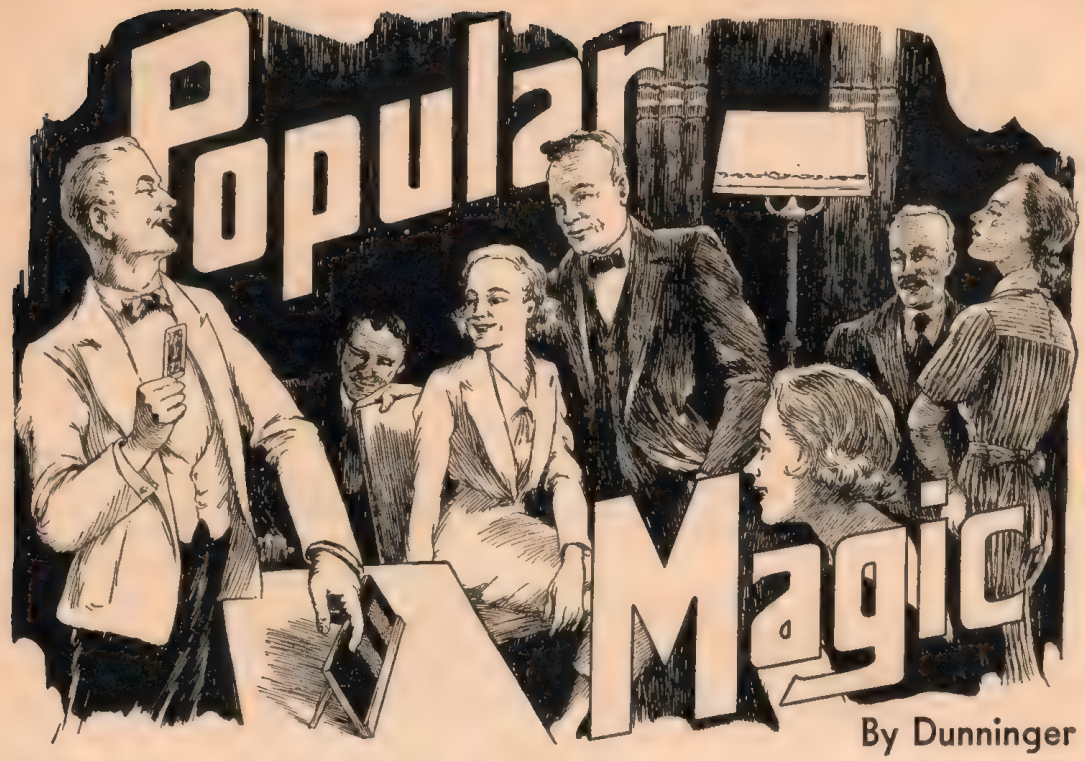
Old style compression grease cups of the type shown in Fig. 4 can be altered conveniently to make oil cups of generous capacity. There are many out-of-reach places in countershaft, motor, and power tool assemblies where the installation of such oil reservoirs would minimize the danger of scored and burned-out shaft bearings. The particular grease cup, illustrated in Fig. 4, is approximately ¾" in diameter, and the method of adapting it for this usage is shown in the adjoining cross-section. The only important consideration is that the oil wick must make contact with the shaft to be lubricated. Heavy wicks of the type used in alcohol burners generally included with amateur chemical sets, are ideal for the purpose.



The conversion of a grease cup to an oil cup is accomplished by the method illustrated below. The wick must pass through the grease hole in the bottom.

One of the most useful yet least understood tools is the common file. A particularly important application of this

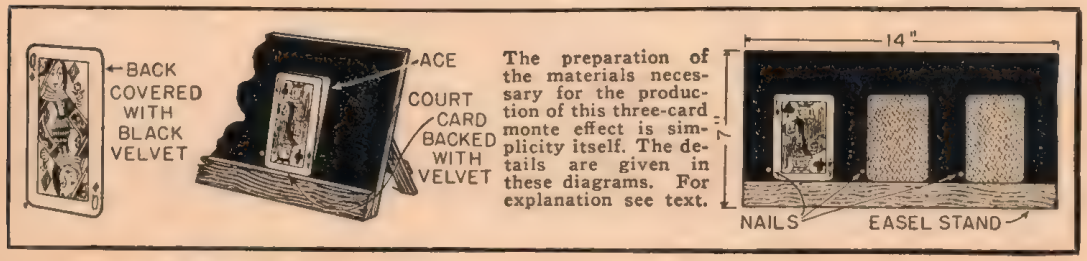
(*Continued on page* 87)



By Dunninger

THIS month we again present three excellent simply-made effects, which anyone can construct in a short time and use to mystify any audience. In the first effect, three cards, the ace of spades, and two court cards, are shown resting on a velvet-covered wooden stand, constructed in easel fashion, about 14″ long an 7″ high. A thin strip of wood is nailed along the lower edge to form a ledge upon which the cards may rest. In presenting the effect, the three cards, mentioned before, are removed from the stand, and are very slowly shuffled. The audience is requested to follow the position of the ace. With their backs toward the audience, the cards then are arranged upon the stand, whereupon any member is requested to call the position of the ace. Regardless of the choice made, when the card called is turned face forward, it is found to be one of the court cards. Try as often as they will, the location of the elusive ace is never discovered by the spectators.

Explanation: Six cards are used; the three originally shown, and three court cards of the same suite as two of the cards in the first group; the latter are backed with black velvet. In making these, the backs of the cards are first covered with glue, then they are placed upon remnants of velvet used for covering the stand. When dry, they are neatly trimmed around the edges. These three cards, velvet side facing the audience, are arranged upon the stand, and at a short distance become invisible. The



The preparation of the materials necessary for the production of this three-card monte effect is simplicity itself. The details are given in these diagrams. For explanation see text.

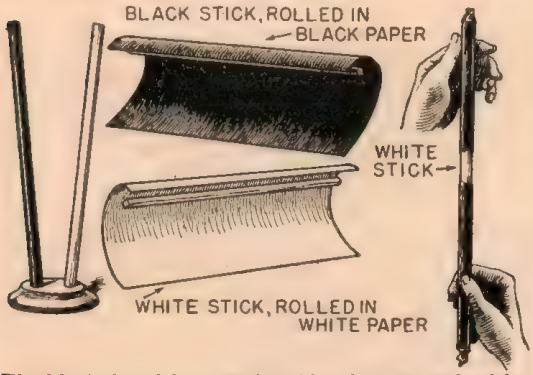
Joseph Dunninger, celebrated "mentalist" and magician, whose articles appear exclusively in this publication, is the world's foremost society entertainer, and has appeared before more celebrities than any of his contemporaries. Among those he has mystified are President Franklin D. Roosevelt, ex-Presidents William Howard Taft, Calvin Coolidge, Warren Harding, Herbert Hoover and Theodore Roosevelt, H. R. H. Duke of Windsor (formerly King Edward VIII), Thomas A. Edison, etc.

three unprepared cards, after being shuffled, are arranged on the rack; each card is placed directly on top of a velvet covered card. Therefore, regardless of where the ace of spades may be, when the choice is made, the magician has but to turn over the two cards as though they were one. Thus, a court card will be shown to the audience. The chosen card then is returned to the easel, face down, and the three unprepared cards are removed from the stand and shuffled for the next victim. Small black headless nails, forced into position upon the stand, can be used to serve as a guide for placing the unprepared cards.

"Devilsticks" is the title we have chosen for the second effect. Two wooden dowels, 14" long, and ½" in diameter, are required for this experiment; one is painted white, the other black. These are displayed in upright position, their lower ends resting in two holes drilled in a wooden circular stand. In presenting the effect, two spectators, selected from the audience, are called to the platform, and are stationed at opposite sides of the stage. The wizard with arms bared to the elbows, and making no deceptive moves, wraps the black stick in a piece of black paper, slightly wider than the stick itself. The parcel is handed to one of the spectators, who is requested to hold it in full view; meanwhile the wizard repeats the operation with the white stick, which, however, is rolled in white paper; this is handed to the second spectator. With patter suitable to the occasion, the magician explains that he is about to accomplish a miracle by causing the sticks to change places. Upon tearing the parcels away, the wizard's prediction is found correct; the black stick emerges from the white parcel, and the white stick comes out of the black wrapping.

Two wands mysteriously exchange places, when held by spectators at opposite sides of the stage. For details see lower illustration.

Left — The colored handkerchief called for rises at command—thanks to the hair.

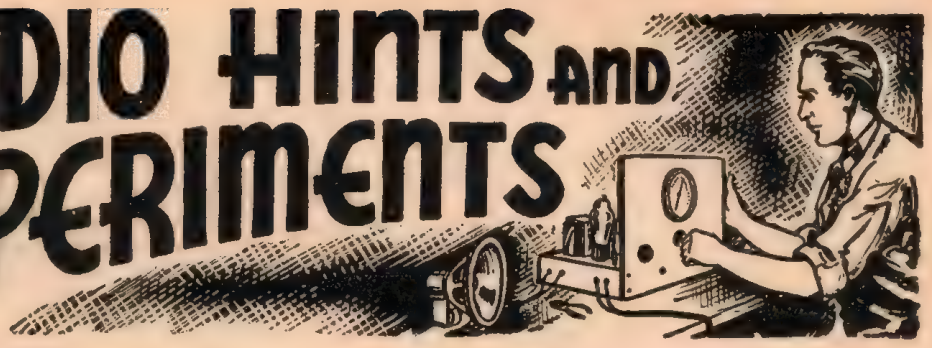


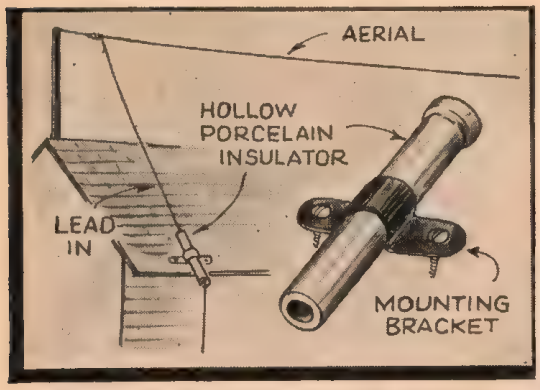
The black dowel is actually white, but covered with a black paper tube, and vice versa.

Explanation: This seemingly impos-

(*Continued on page* 88)

RADIO HINTS AND EXPERIMENTS

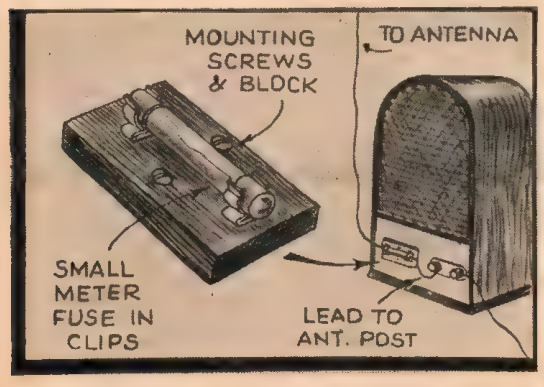




REMOVING SOURCE OF NOISE

ONE point at which many installers of aerials fail is in correctly securing the lead-in at the point where it passes over the edge of the roof. The insulation on the wire soon rubs off and the bare wire then moves back and forth against the metal gutter with every breeze.

This is the cause of inoperation and much noise in the radio set and is difficult to locate. The use of a hollow porcelain tube, such as used by electricians, bolted to the roof edge will prevent any possibility of such action taking place. (See diagram above.)



AN ADDED RADIO PROTECTION

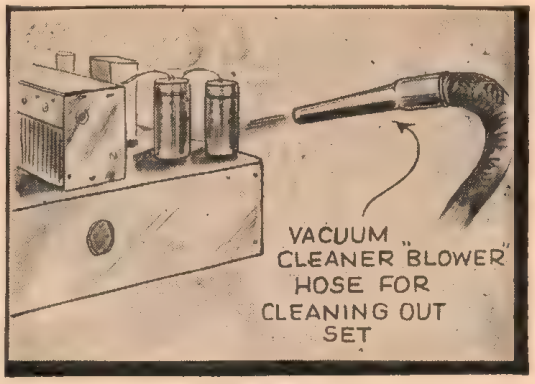
THOSE who fear the effects of lightning charges on their radio sets can add a precautionary fuse to the aerial line, in addition to the usual lightning arrester.

The tiny meter fuses which are sold to protect delicate instruments will blow with extremely small current overloads. Thus, a heavy static charge on the aerial wire which might injure the aerial coil, will blow the tiny fuse long before the current reaches sufficient intensity to injure the set.

VACUUM CLEANING A RADIO SET

THE use of cloths and brushes in cleaning the accumulation of dust on a radio chassis is extremely risky—especially if the wielder of the cloth is not familiar with condenser plates, coils and similar delicate parts.

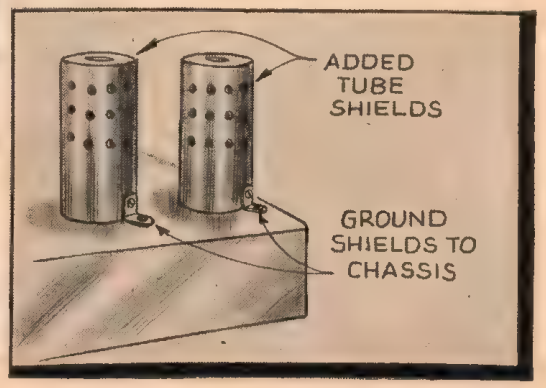
Some vacuum cleaners are equipped with an attachment for blowing out the dust which settles on radiators and curtains. This attachment is ideal for cleaning the radio chassis, as the dust is removed without actual contact of the instrument.



IMPROVING MIDGET RECEIVERS

MANY midget sets of the A.C.-D.C. type can be improved materially by the addition of tube shields of the cylindrical or form-fitting types to the R.F., converter and I.F. tubes. These sets are often addicted to birdy whistles if the volume control is advanced too far or the aerial pickup is too small.

The tube shields, too, often will permit readjustment of the trimmers with improved sensitivity and volume.

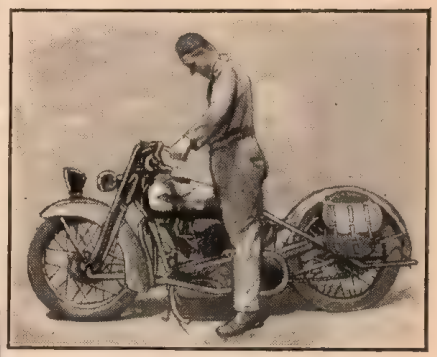


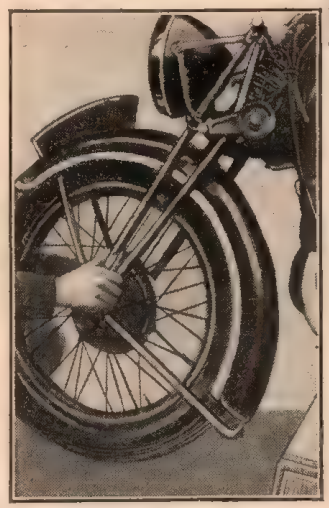
Tips for the Motorcyclist

By Ivan J. Stretten
Commissioner, American Motorcycle Association

THE two accompanying photographs show the proper and improper way to go about locating looseness in the steering head of your motorcycle. The one showing the rider straddling his machine and pulling up on the handlebars, is the improper way in which to go about doing the job; while the other photograph which shows the front wheel lifted clear of the ground is the correct method (a box being pushed under the motor base and frame of the motorcycle). Now the rider or mechanic can take hold of each side of the front forks and pull firmly back and forth, to determine the amount of play.

To determine if the steering head of your motorcycle is loose, do not use the method shown in the photograph at the right. Instead, prop up the motorcycle on a box and test as shown below.





A Wiring Tip

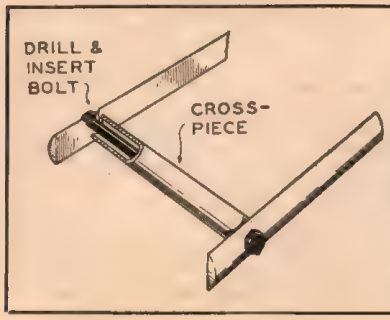
WHEN it is necessary to replace a lighting set loom, it is often a problem to find out where each wire goes. However, the job can be made quite simple if the old loom is cut through, before removing, fairly close to each wired fitting. Thus, a short length of wire is left on each connection and should be a different color from any of the others. All that remains is to pick out a colored wire in the new loom and substitute it for the short pieces of wire of the same color, and so on.

Protecting Cable

LIGHTING cables such as those running from the motorcycle to the sidecar light, often persist in rubbing against parts of the machine until they cause shorts. This can be prevented by sliding a length of copper tubing over the offending part, and taping same to a suitable part of the machine.

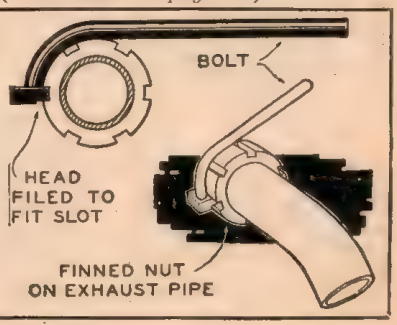
Repairing Stand

WHEN the tubular cross-piece of a motorcycle rear stand fractures, it can be repaired quite easily by drilling through the side arms to meet the hole running through the cross-piece, and then inserting a long steel bolt to hold the fractured part firmly together. See Fig. 1. (*Continued on page* 73)

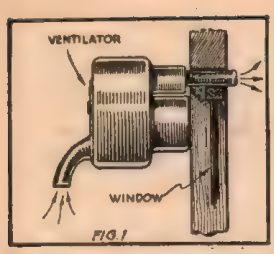


If a fracture occurs in the tubular cross-member, drill a hole through both side arms to meet hole through cross-piece, then insert a bolt as shown at the left.

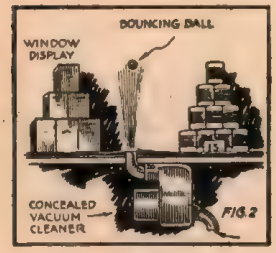
A wrench to remove the finned nuts on the exhaust pipe can be made very easily from a long bolt bent as shown and filed to fit the slots.



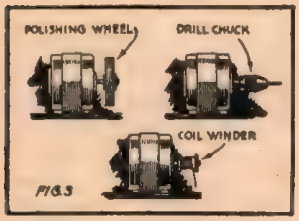
Using the Old Vacuum Cleaner



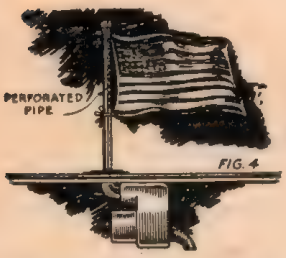
Try this arrangement in your kitchen or attic.



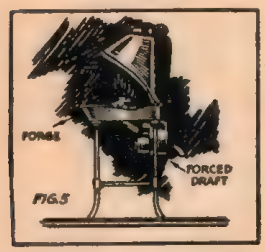
A novel window display.



Making use of the motor.



The flag waves in a mysterious breeze.



A vacuum cleaner is excellent for operation of the forge; or, as shown at the right, for burning cheaper grades of coal in the furnace.

PROBABLY one of the most practical uses for an old vacuum cleaner is that shown in Fig. 1—here it is used as a ventilator to remove cooking odors from the kitchen, tobacco smells from the smoking den, or heat from the attic.

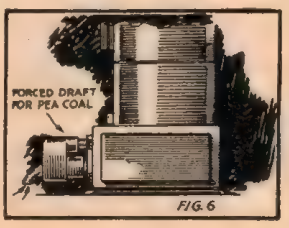
The vacuum cleaner sucks air in at the usual nozzle and blows the air out through the opening to which the dust bag was formerly attached. Before using the cleaner, examine it to make sure that the rotor or fan is securely fastened to the motor shaft. This has a habit of working loose on the shaft. In some cases, improved results, when used as a ventilator, will be obtained by opening the circular disc in front of the housing, "sucking up" the air here instead of forcing it to come up through the long, narrow nozzle, which was specially shaped for the purpose of collecting dust from carpets, etc.

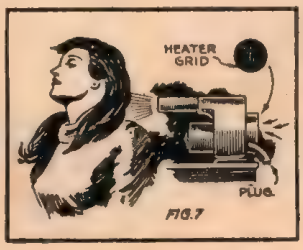
An interesting show-window display may be arranged with a vacuum cleaner, as shown in Fig. 2. Here the cleaner and its motor are hidden under a piece of cloth. A celluloid ball bounces up and down mysteriously in the stream of air.

The electric motor of the vacuum cleaner may be put to dozens of uses. Some suggestions are shown at Fig. 3; one is using the item as a silver polisher; another, as an electric drill—by adding a chuck to the motor shaft, etc.

For amateur theatricals, show-window displays, etc., another use of the vacuum cleaner is for a "flag-waving" effect, as illustrated in Fig. 4. The compressed air from the vacuum cleaner blower passes up through the pipe as shown and passes out through a slot, or a series of holes drilled in the pipe adjacent to the flag.

An old vacuum cleaner will prove very useful as a source of forced draft on a forge as shown in Fig. 5. Another practical arrange-





You can get plenty of hot air for drying hair with this set-up.

Many of us have several old vacuum cleaners which have seen better days, and are now reposing in the attic or cellar. These will find a new lease on life if some of the ideas here suggested are put into practice.

ment for using the vacuum cleaner is as a source of *forced draft* for burning pea-coal in an ordinary furnace, as shown in Fig. 6. Many people have learned to cut their coal bill 40% to 50% by using this simple arrangement. A thermostat should be purchased, for a couple of dollars, and connected to the motor circuit, so that whenever the temperature in the house drops to a pre-set figure, say 70° F., the motor blower starts up. When using this method, a thin layer of ashes is always left in the furnace.

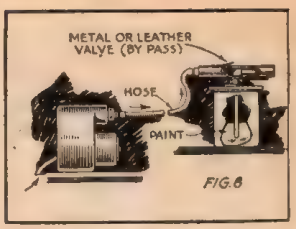
A useful device is a motor-driven "hair-dryer." A device of this type is illustrated at Fig. 7; to provide warm air, an electric heater grid, which may be a small electric toaster heating element picked up at any 5 & 10 cent store, is mounted in front of the air intake as shown. The heater should be arranged with a switch so as to be cut out of the circuit when desired. The ingenious electrician may also provide such a device as this with a rheostat, so as to regulate the speed of the motor and the strength of the air blast. Even the vacuum cleaner hose will be of benefit here. Then the air blast can be directed to the place desired.

An air-operated "paint-sprayer" is shown at Fig. 8; here again, a vacuum cleaner comes to the rescue. The blast of compressed air coming from the cleaner "fan" is caused to "suck" paint from the glass or other container. To stop the device from spraying paint, an exhaust valve, made of metal or leather, should be fitted on the air pipe as shown, this valve being opened or closed by the pressure of a finger.

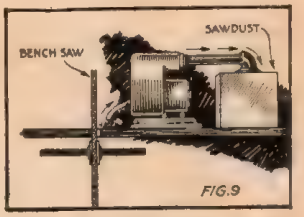
A very good use for a vacuum cleaner is shown in Fig. 9, where the cleaner is mounted close to any wood or metal working machine where a quantity of fine dust is given off. (In buffing machines it is important to remove the metal dust particles.) The dust is pumped, by means of the cleaner system, into a closed box.

For the "amateur showman" the vacuum cleaner comes in handy when ar-

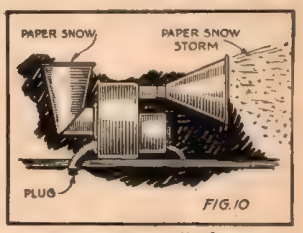
(*Continued on page* 81)



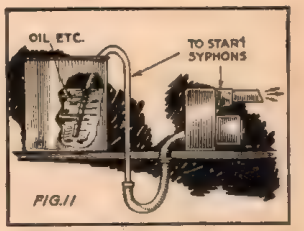
A simple paint sprayer can be made in this fashion.



For removing dust in the shop.

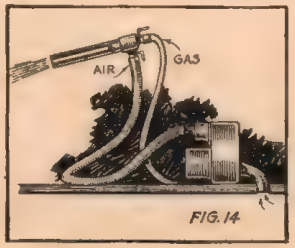


A "snow storm" for amateur theatricals.

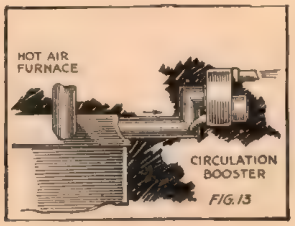


Syphoning oil, or volatile fluids.

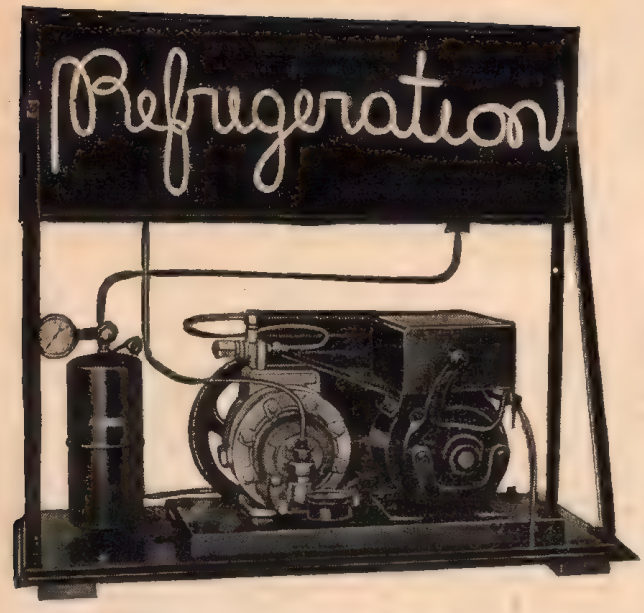
Filtering can be speeded up by this method.



A discarded vacuum cleaner will furnish sufficient air for a light-duty brazing torch.



This arrangement will hasten the distribution of heat in homes having hot-air furnaces.



Servicing

Part 9

By L. K. Wright, M.E.

Originator and Chief Instructor of Refrigeration Servicing Course at the New York Y. M. C. A. Trade & Technical School, Author of "Official Refrigeration Service Manual," Vols. I and II—"Official Air Conditioning Service Manual," "Commercial Refrigeration," etc.

The previous installment presented data covering the cutting, reaming and trimming of copper tubing—a simple and yet very important phase of refrigeration work. If the student has practiced and mastered this part of the project the work outlined in this chapter will result in perfect flares. Improper cutting, reaming or trimming will prohibit correct flaring.

COPPER tubing is joined to fittings in refrigeration apparatus by what is known as the flare method. This is the only joint which stands up under the conditions found in this field. Of course, there is the soldered type of joint, but this is used only on large equipment and but rarely on small units.

This flare is really a skirt or shoulder. A nut applies pressure from behind this shoulder and pulls it into tight contact with the fitting, forming a gas tight joint when properly done.

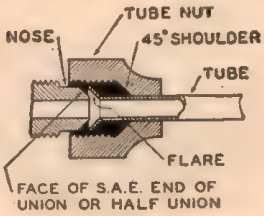


FIG. 2

The flared end of the tube, if properly made, will make a gas-tight seal. Diagram shows relation of parts.

Let us refer to Fig. 1, which illustrates a flare nut, and gives a sectional view as well. Note that the nut is provided with a 45-degree shoulder and is drilled to fit the tube snugly. An S.A.E. thread is the standard used on all tube joints.

Fig. 2 shows a nut loosely fitted on the tube, which has been provided with a flare or skirt at a 45-degree angle. Such a nut can be attached to an S.A.E. flare fitting of proper size to suit the nut and if the nut be run up on the fitting it will be obvious that the flared end of the tube will be brought into tight contact with the male end of the fitting, forming a copper gasket and joint at the same time.

The illustrations and data given in Fig. 3 provide an insight as to the construction and sizes of standard straight unions. These are used, with nuts, to join two pieces of copper tubing together. Note the nose or extension on

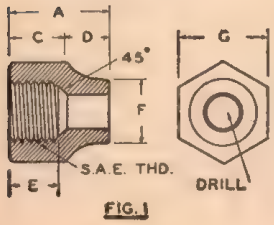


FIG. 1

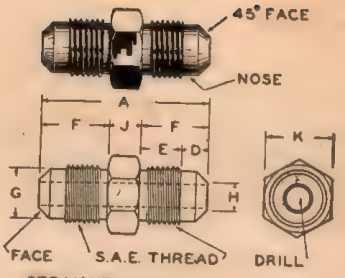
REFRIGERATION FORGED BRASS FLARED TUBE NUT

Tube Size	S. A. E. Thd.	Drill Size	A	C	D	E	F	G
3/16"	3/8—24	.192—.197	1/8	9/64	3/8	9/32	1/8	3/4
1/4"	7/16—20	.255—.260	1/8	9/64	3/8	11/32	1/8	3/4
5/16"	1/2—20	.317—.322	1/8	9/64	3/8	3/8	1/8	3/4
3/8"	5/8—18	.380—.385	1 9/32	5/8	1/8	7/16	9/64	7/8
7/16"	11/16—16	.442—.447	1 9/16	21/32	1/8	1/2	3/4	1
1/2"	3/4—16	.505—.510	1 9/16	21/32	1/8	9/16	3/4	1

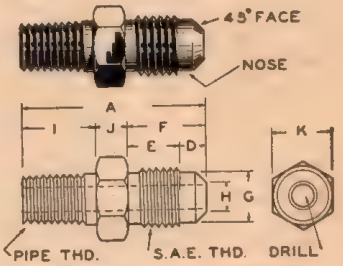
REFRIGERATION STANDARD DOUBLE END FLARED TUBE UNION

Size Tube	Thread S. A. E.	Size Drill	A	D	E	F	G	H	J	K
3/16"	3/8—24	1/8	15/16	3/32	3/32	3/8	13/64	5/32	7/16	7/16
1/4"	7/16—20	5/16	1 5/16	5/32	1/32	1/2	1/32	5/32	7/16	7/16
5/16"	1/2—20	7/32	1 1/32	7/16	3/8	7/16	13/32	1/4	7/32	1/2
3/8"	5/8—18	9/32	1 1/2	7/32	1/32	5/8	1/32	5/16	1/4	5/8
7/16"	11/16—16	5/8	1 3/32	1/4	7/16	11/16	31/64	11/32	9/32	11/16
1/2"	3/4—16	13/32	1 13/16	1/4	1/2	3/4	11/32	7/16	5/16	3/4

Tube Size	Pipe Thread	S. A. E. Thread	Drill Size	A	D	E	F	G	H	I	J	K
3/16"	1/8"	3/8—24	1/8	15/16	3/32	3/32	3/8	13/64	5/32	3/8	7/16	7/16
1/4"	1/8"	7/16—20	5/16	1 1/16	5/32	1/32	1/2	1/32	7/32	3/8	7/16	7/16
5/16"	1/8"	1/2—20	3/32	1 3/32	7/16	3/8	7/16	13/32	1/4	3/8	9/32	1/2
3/8"	1/4"	5/8—18	9/32	1 1/16	7/32	13/32	5/8	17/32	5/16	7/16	1/4	5/8
7/16"	1/4"	11/16—16	5/16	1 13/32	1/4	7/16	11/32	37/64	11/32	7/16	9/32	11/16
1/2"	3/8"	3/4—16	13/32	1 5/16	1/4	1/2	3/4	11/32	7/16	1/2	5/16	3/4



STRAIGHT UNION FIG. 3



HALF UNION FIG. 4

the male ends of these fittings. The flared end of the copper tube contacts the 45-degree end of the nose or extension.

Half unions are so termed because one end or half is provided with an S.A.E. flare thread and the other with a standard pipe or Briggs thread. All openings in compressors or the service openings in compressor valves are pipe thread. Do not get them mixed, as screwing two dissimilar threads together (an S.A.E. and a pipe thread) will ruin both.

Half unions are illustrated in Fig. 4 and careful examination of the sectional view in this sketch will show the taper of the pipe thread end.

Reference to Figs. 1, 3 and 4 provides an insight as to the standard dimensions of these various fittings.

In general, there are two types of flaring tools, viz: punch type and yoke variety; the former is shown in Fig. 5. It consists of a pair of blocks between which the tubing is clamped, the tube being held tightly in place by pressure from the wing nuts. The punch is struck with a hammer to form the flare.

A popular yoke type is shown in Fig. 7. This tool is of moderate cost, although somewhat more expensive than the punch type, and is provided with a yoke piece which has a ram at the end of a screw piece. By screwing down on the handle the ram is forced into the tube end, forming the flare.

Fig. 6 illustrates a very fine flaring tool. It makes use of a cam lever to hold the blocks together, making it a tool which is somewhat easier and faster to use, but it is somewhat more expensive than the previous yoke model.

The above tools are provided with holes to grip and flare all the small sizes of tubing used in household and small

(*Continued on page* 89)

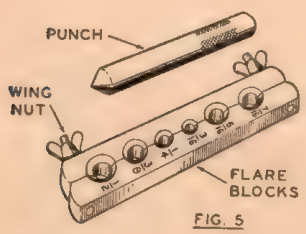


FIG. 5

With this block flares are made by tapping the punch with a hammer.

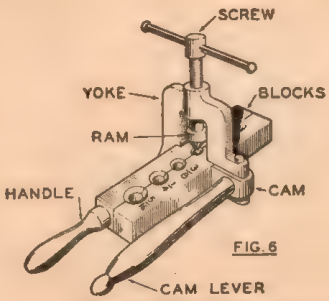


FIG. 6

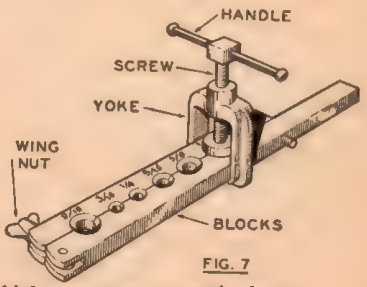
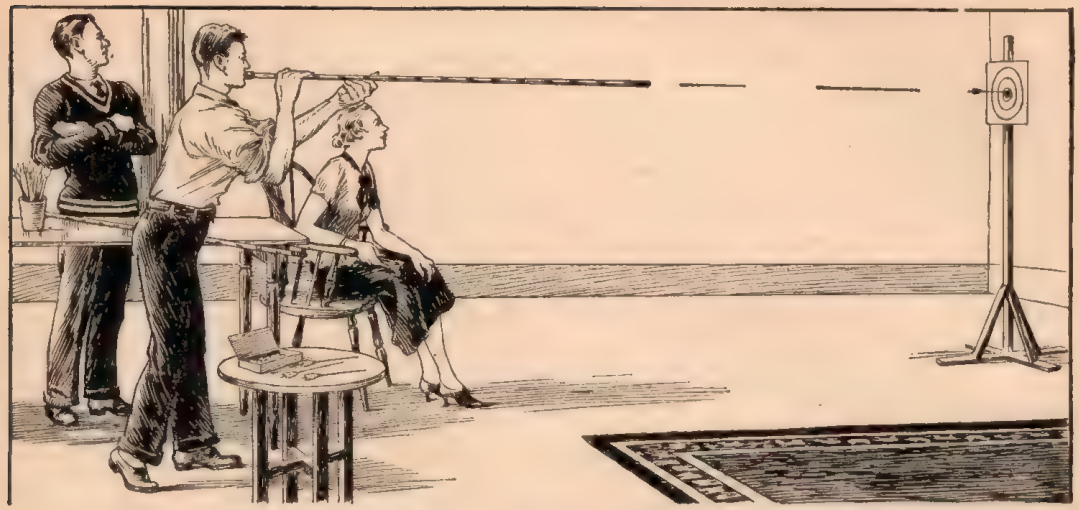


FIG. 7

Two yoke-type flare tools which are easy to manipulate.



Anyone experienced with a blowgun will have no difficulty in hitting a target the size of a grape at a distance of 25 feet. Details for the construction of such a gun and the "ammunition" are presented here.

How to Make a Blowgun

By EARL B. POWELL

HOW would you like to be able to hit a target the size of a grape at 20 or 25 feet, with regularity and ease? You can—with a dart blown from a blowgun—so here are directions for perhaps the most accurate of all primitive weapons which, for some reason, practically aims itself. This is the blowgun of which you read in stories about explorations in the jungles of Asia and South America; it is called "Sumpitan" in Malaysia and "Zarabatana" in South America; it is much used, and the tales of its great accuracy are not exaggerated. The blowgun was also used by the Creeks and other Indians of the southeastern portion of what is now the United States; it was made of native cane (a species of bamboo).

A blowgun may be used not only for target work, but for collecting small birds and large insects for mounting, using for ammunition dried clay pellets, which will kill without marring the specimen. Taxidermists find it valuable for that very reason. This gun can be made as long as you wish; but you will find six feet about the handiest length.

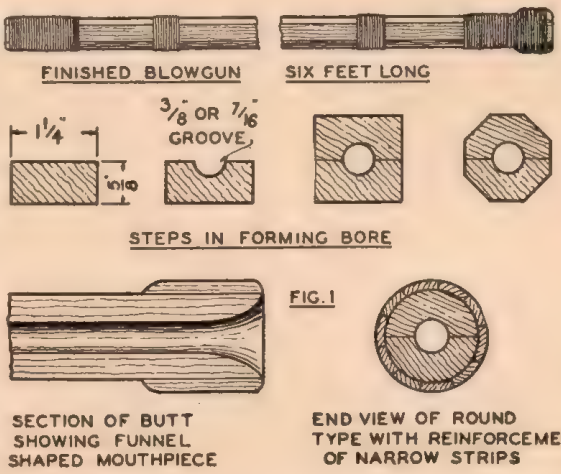

FINISHED BLOWGUN
SIX FEET LONG
1¼"
3/8" OR 7/16" GROOVE
STEPS IN FORMING BORE
SECTION OF BUTT SHOWING FUNNEL SHAPED MOUTHPIECE
END VIEW OF ROUND TYPE WITH REINFORCEMENT OF NARROW STRIPS

FIG. 1

The gun is formed by gluing two wooden strips together; then shaping and binding them to suit your fancy.

Rip out two pieces of straight-grained lumber, hardwood preferred, such as birch, maple, walnut, or poplar—or even soft

(*Cont. on page* 75)

The Home of Tomorrow!

(*Continued from page* 31)

measures 40 by 20 feet. An iron stairway leads to the top of the garage and a five-foot runway, surrounded by a fence, offers an ample passage-way. It is not a far cry to imagine a similar construction dropped below the ground level. For those who do not care to extend their imaginations this far, we present the underground theatre and movie house built in Hamburg, Germany. Our informant advises that this was built below the surface of the ground because of a lack of space. However, no use is made of the space provided by the grass sodded vault, hence it is most likely that the important information was deleted by the official censor. The doors of this entertainment sanctuary, being gas-tight, make it most probable that this structure was built in this fashion so that it would make an elusive target in event of an air raid, would be a safe refuge against poison gas and offer a splendid meeting hall during hostilities. If theatres can be built underground, so can homes!

Candid Photography

(*Continued from page* 41)

similar to that used with a negative. This is the sum total of the printing process; but it lacks a whole lot of being the sum total of the printing art.

Photographic printing is an art because it can never be mastered without a generous amount of practice. The writer has told hundreds of students that the only way to learn photography is to use up photographic materials in practice; and in no branch of work is that more true than in printing. The only way you can learn to print is deliberately to make errors. Overexpose and underexpose. Overdevelop and underdevelop. Do all four of these in every possible combination and do it with several types of negatives. Until you know unerringly what grade of paper a negative demands, make a practice of printing each negative on at least four, and even better on six, grades of paper.

Any sincere amateur who will conscientiously make the best prints he possibly can on each of six grades of paper and do this with not less than twenty-five assorted negatives will no longer have the slightest hesitation as to what grade of paper a negative demands. Until he has done this, there is no one who can tell him how the choice is made, or explain to him the characteristics of the various grades so that he can properly match negatives and paper grades. This demands experience.

Very often you will hear it said that a thin negative demands hard paper and a heavy negative demands soft paper, yet more often than not this is exactly the opposite of the truth. The grade of a paper refers to its natural contrast; and the contrast of the paper should be such that it neutralizes the contrast of the negative. A contrasty negative takes a flat paper while a flat negative demands a contrasty paper. Naturally a medium negative demands a medium paper. That is quite easy to state and quite easy to understand but it is always followed by the next question. "What is a contrasty negative and what is a flat negative?" That is also easy to answer but the answer carries no conviction. The lightest and darkest portion of a flat negative are not very widely different, while the lightest and darkest portions of a contrasty negative may go the full scale from complete opacity to complete transparency. This does not confer upon the amateur the ability to distinguish among the various characteristics of a negative such as thinness, lack of contrast, density, extreme contrast, good gradation and abnormal gradation. The only thing to do is to print each negative on each grade of paper until you begin to get the general idea. You will undoubtedly be surprised because you will find that some negatives which you thought demanded a hard paper will only print properly when a soft paper is used.

Another point which confuses so many amateurs is that of the detail of a photograph. Most amateurs speak of detail when they really mean contrast and contrast is the exact opposite of detail. The picture of the greatest detail is a flat, gray, usually unattractive print, but it does show every little bit of detail in the picture because none of it is hidden in a heavy black shadow and none of it is obliterated in a blinding highlight. If you want to see a picture with good detail hang a piece of black worsted across a white bath towel. Then make a photograph in which you can see every detail of the weave in the black worsted and every loop of thread in the white bath towel; something you can hardly do if you have any degree on contrast whatsoever. When you have done this you have made a photograph of detail. Then make another print in which the worsted is solid unrelieved black and the bath towel is just as solid and unrelieved white, without any texture or any structure being visible in each. Then you will have a picture in which contrast surpasses detail.

An exercise often given to students to enable them to teach themselves printing without an instructor being at their elbow, is the texture chart. This is a piece of cardboard, (a discarded checker-board will do) which is covered with plain gray paper. Upon the chart are glued squares of various materials such as soft woolen, worsted, cotton, velvet, satin, smooth leather, patent leather, coarse grained leather, wood shavings, sand paper, rubber, celluloid and other similar materials. The problem is to obtain a print which shows, beyond any question of a doubt, the essential characteristics of the texture of each one of these substances. When you can make that photograph you can make any photograph, that is as long as your desire is to make a good photograph. If you want to run after some of the so called ultra modern, cockeyed branches of photography then you don't have to know anything about photography at all; just get a cheap camera and shoot it while blindfold.

But to return to detail and contrast. You will find that texture requires a balance between detail and contrast for its proper representation. That is, there must be no detail lost in either shadow or highlight but

between these there must be the greatest possible range of tone values. As a rule a good texture negative will give the best results on normal or medium hard paper.

Another question which the amateur must decide is the surface of the paper he will use. If the writer had his way the use of ferrotyped or glossy paper would be restricted by law to the uses of the engraver where such a print is considered a necessity; it is the most unattractive surface ever made and an obstacle to good printing which is almost impossible to overcome. Luster surfaces are always in good taste and for extreme size enlargements, that is fourteen by seventeen or larger, when the subject has large masses, such as a head portrait, a rough surface may be used. It is difficult to use dead matt paper because the picture apparently has no brilliance and only a negative of unusual snap will give a really good picture on this paper. The use of cloth surfaces is open to serious question as the surface design is so obvious that it takes the attention away from the picture, and this is one thing which should be avoided under all circumstances.

Another consideration is the color of the paper itself. Unless a picture is to be toned after development there is rarely any reason for printing it on any other than white or at the most an extremely light cream tone of paper. The papers which are definitely buff always look out of place for everything except a sepia picture. It is well to remember however that you will never go wrong if you use white. Colored papers, that is, pink and green and blue, were introduced a few years ago but fortunately they did not obtain any popularity.

In the development itself there are two factors well known to the professional which the amateur overlooks. The first of these is the fact that the amount of bromide specified in a paper developer is the minimum amount which may be used safely with that paper. Most experienced printers use approximately one grain of crystal potassium bromide to each ounce of working developer. That is if sixteen ounces of developer are made up sixteen grains of crystal potassium bromide are added to the developer. If the paper does not come up with proper brilliance, additional bromide is added and the maximum limit is that amount of bromide which causes the blacks of the print to take on a dull greenish tinge instead of having a good blue black.

Another point is that the instructions for most developing papers state "this paper should be exposed so that it will not reach complete development *in less than—*". For contact papers the specified time is usually forty-five seconds and for enlarging papers one and one-half minutes. The significant thing is that this time is always a minimum limit. Most amateurs work and strive to get their exposures so that the developing time is exactly forty-five or ninety seconds, as the case may be, and in most cases this very point itself prevents them getting the best possible prints. Most contact papers should be developed from sixty to seventy-five seconds and some of them will stand a full two minutes. Enlarging papers should, as a rule, be developed for two or two and a half minutes and some of them will stand fifteen minutes development. The bromide print which is obtained by a four minute development is not slow in coming up. At the standard one and one-half minutes it looks fairly good and would then be taken from the developer by most amateurs. The point is that the picture does not go on growing in density but *it does continue to increase in quality.* Of course the exposure will be cut down a little but not to any great degree.

The final point is that ninety-nine amateur prints and enlargements out of one hundred are not only underdeveloped but also underexposed. The underexposure is not so frequent it is true, but most of the prints made by amateurs are entirely too light and gray to have real quality.

One experienced printing instructor told his classes "let the print develop until you just can't stand it any longer, then hold your hands behind your back until you can't stand that any more, then go outside the dark room and take a walk around the block and come back. Your picture will probably be properly developed." Obviously that statement is an exaggeration but only a slight one because it does express the great truth that the print which the average amateur wishes to take from the developer is usually just about half developed.

The remaining hints on making good prints are merely those little details too often overlooked. A print should have a *uniform* white margin without spot or stain upon it, or it should be trimmed flush into the picture itself. Any photograph which is worth keeping is worth mounting either in an album or on a suitable mount, because the finest picture ever produced by the hand of man looks crude and unfinished until it is properly framed (and in the case of the photograph the mount is the essential part of the framing). If the picture is to be used for wall decoration, it will of course be supplied with a conventional frame and glass cover, but even those prints which are to be kept in portfolios should be carefully mounted.

Not only should the print be mounted but every little spot and defect must be removed and the prints polished with a good floor wax. Only when all of this has been done can a photograph really be said to be finished and to be ready for display.

If you were offered fifty curled, untrimmed, unspotted, unmounted prints to go through and if these prints were taken from the worlds best photographic show, you would probably go through the entire pile without finding a single one that appealed to you. You can't expect your own efforts therefore to look good unless you give them a chance to show what is really in them.

Make up your mind that photographic printing is the important step of photography. Learn through personal experience to get the best possible print out of a negative so that you will *know* and not have to guess. Finish your prints completely and do not allow them to be seen until they are fully "dressed". If you will follow these hints, you will find that practically all of your printing troubles will vanish into thin air.

Tips for the Motorcyclist

(*Continued from page* 65)

A Handy Magnet

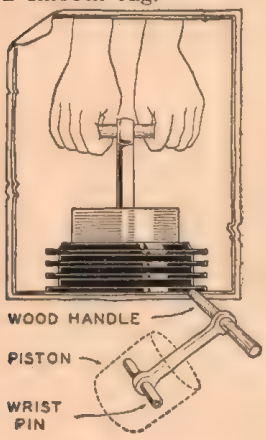
A VERY handy emergency electro-magnet for retrieving lost metal parts, such as nuts or washers, which have dropped into your motorcycle crankcase or other awkward place, can be made easily by simply coiling some insulated wire round a screwdriver and connecting the ends to the storage battery.

Retrieving Carbon Brush

THE old tip of placing a blob of heavy grease on the rim of the flywheels, to pick up a nut or washer that has dropped into the crankcase, can also be applied to a magneto on a motorcycle engine if the carbon brush happens to slip through the opening when the instrument is being cleaned. The grease should be smeared on the slip ring and the magneto turned slowly until the brush is picked up. The slip ring can afterwards be cleaned with a gasoline-soaked rag on the end of a lead pencil.

Chromium Polish

AN excellent non-abrasive polish for chromium plating can be made in the following manner: Mix half a teaspoonful of ammonia with a quarter pound of soft soap, then apply with a soft cloth and finally polish with a smooth rag.



Lapping-In Rings

AN old bicycle pedaling crank, with the eye reamed out to fit the wrist pin, makes an excellent handle for lapping in new piston rings on an old piston (left). The lapping job can be made easier if a wooden handle of some sort is driven into the large end of the crank.

Rejuvenating Old Plugs

WHEN the central electrode of a three-point spark plug (as often used in motorcycle engines) is badly burned, the plug can be given a new lease of life by simply slackening the gland nut and turning the body until the electrode presents an unburned surface to each of the points.

An Emergency "Nut"

WHEN an important nut vibrates loose and becomes lost from your motorcycle and a spare is not available, an emergency "nut" can be easily made by the use of copper wire. The wire is wound round the thread of the bolt working inwards. By this method the bolt can be drawn home quite tight; the two ends of the wire then are twisted securely together.

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Before mailing your letters to this department, make sure your name and address appear on the letters, drawings, and envelope. Please address Patent Editor.

Reaction Driven Propeller

Raymond R. Bone, Herndon, Kansas, asks us to comment upon a reaction driven airplane propeller.

Answer: The propeller you have designed is inoperable. You must remember that in any gas engine, compression of the gases is of great importance. Your design does not allow for this compression and it is not likely that the gasoline, fed under pressure, would serve as a substitute. However, even assuming that you could get this propeller to operate, the efficiency of the reaction type of drive would be found to be so low, at normal altitudes, that it would not pay a manufacturer to develop this system or to include it on any plane. If you think that you can produce an engine of this type and bring up its efficiency to a point comparable with that of an explosive type gasoline engine, we would recommend that you build the model. We are extremely doubtful that you can come anywhere near the requirement. We would therefore advise against further action.

Cigarette Filter

Daniel Dalonzo, Collingdale, Pa., recommends the construction of cigarettes with a tobacco filter at one end.

Answer: Before proceeding any further with this thought, we would suggest that you investigate this field further. One famous and nationally known brand of cigarette has a filter tip. Many of the Russian cigarettes have heavier tubes at one end in which various types of filters are located. A small tuft of cotton frequently is employed. In your case, only a search would reveal if you have anything patentable.

Auto Speed Telltale

Joe D. Smith of Clarksburg, W. Va., recommends a system of indicator lights which would announce to any driver the speed at which the car ahead is traveling. He asks our opinion.

Answer: No doubt such a signal would be a fine thing, not only for the other cars on the road but also for every motorcycle policeman or traffic officer. No longer would there be any need for speed traps. All the officer would have to do would be to whistle, order the offender towards the curb and hand him a summons for traveling above the prescribed rate of speed. But this is no great improvement upon an idea which was patented some years ago and which printed license numbers on tickets and distributed them along the road whenever the car moved faster than its pre-arranged setting; or, the patented article which painted a stripe of color on the road whenever the automobile exceeded the speed limit for which it was set. We feel quite confident that your invention would never become practical because no one would want it on his car and any attempt to force it on the motorist would meet with a well deserved antagonism.

Terminal Marker

P. J. Painter, Braddock, Pa., suggests a terminal marker for various items of manufacture and wants our opinion of the same.

Answer: In accordance with the statement made in the box at the top of this page, we are not revealing any details of this system.

We doubt very much that you can do anything with the suggestion. We admit that it is good and that it could be used by manufacturers to advantage; but, substantially the same idea is employed by manufacturers of other articles. Therefore, the question of protection is of paramount interest. We would recommend that you communicate with a patent attorney to determine what, if anything, you could do.

Road Sander

H. C. Bensinger, East Dearborn, Mich., recommends the construction of a road sander to be towed by a truck which would sprinkle sand on slippery roads.

Answer: It must appear obvious to you that the more slippery the roads are, the less sand will be sprinkled on their surface. This is due to the fact that your sander is operated by traction against the wheels. Also, you must remember that when this truck is traveling slowly, the sand is not scattered well. The greater the speed, the further will the sand be distributed. This is just the reverse of what is required. We do not believe that the present design is the answer to the problem.

Ironing Board

Samuel J. Hepko, Chicago, Ill., has designed a stationary ironing board which occupies very little space against the wall. He asks our opinion of the same.

Answer: We do not see how your ironing board differs from any similar construction aside from an extra support which in our opinion is unnecessary except for extremely heavy work. You will find that much more fussing is required to set your ironing board vertically into the wall cabinet than with any of the devices now available and designed for a similar purpose. We recommend no action.

Road Roller

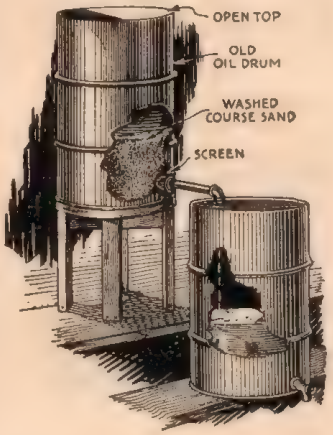
E. Curb, Hoisington, Kan., has designed a road roller which has a multiplicity of rollers, all fastened to one frame; he believes such construction will smooth out the hump in a road.

Answer: We are inclined to disagree with your findings. By adding a multiplicity of rollers to a road surfacing machine, the only thing you do is to distribute the weight among the group. In order to get the same pressure as is now obtainable, it would be necessary to have your resurfacing mechanism weigh as much for each roller as does the double

roller type. Only then would your construction appear to be more effective, but don't forget that it requires much more power to tow such a mechanism and the tractor itself might create considerable damage.

Practical Oil Filter

ONE method of reclaiming oil, drained from the crankcase of the automobile is to float the oil on water, allowing plenty of time for the impurities to settle out. A practical system used in some garages consists of an oil filter made from two 25-gallon oil drums. One drum is half filled with sand, the other acts as a receiver. The reclaimed oil is sold for 10c a gallon but is sold only to those customers specifically requesting it.



—'Bob' Poulson.

U. S. Hoards Silver in Vaults

(*Continued from page* 25)

sionally it turns out coins for such nations as Panama, Mexico and Columbia, but for the first time in many years the U. S. Mint in San Francisco is making ten million pieces of coin for the Chinese Government in dollar and half-dollar denominations.

How to Make a Blowgun

(*Continued from page* 70)

wood if you do not have the hardwood—and, in this ripping, be sure that you get it straight both ways. These pieces should be of whatever length you wish, 1¼" wide x ⅝" thick. At least one of the wider surfaces should be made smooth on each piece. On this smooth side, make a semicircular groove, either ⅜" or 7/16", according to how much air power you think you can supply (I use 7/16"), and be sure that this groove is straight and uniform—for on this groove depends your accuracy.

If you can get these grooves cut in a cabinet shop equipped with a shaper, results will be better; however, the work can be done with a rabbet plane. You

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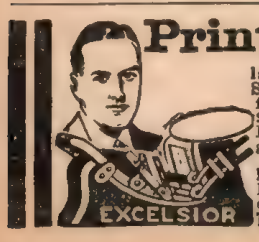

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can also do it with a chisel, or even cut a square groove with a saw and then round it out by running a big rattail file up and down, from end to end, until the groove is even. Once your groove is cut, lay a dowel (5/16" for 3/8" bore, and 3/8" for 7/16" bore) on a piece of sandpaper which has been placed face down in the groove; and then polish the

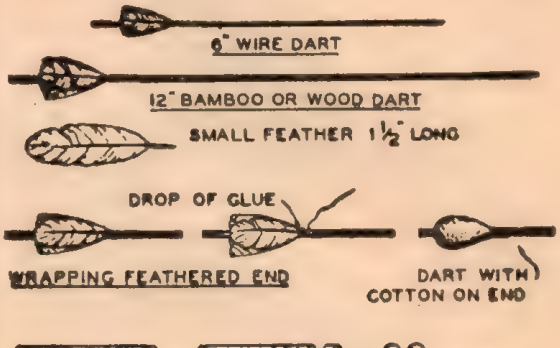
6" WIRE DART
12" BAMBOO OR WOOD DART
SMALL FEATHER 1½" LONG
DROP OF GLUE
WRAPPING FEATHERED END
DART WITH COTTON ON END
CYLINDER OF CLAY CUT IN SECTIONS & ROLLED INTO BALLS
MAKING CLAY PELLETS

FIG. 2

Method of making various types of darts, for use with the blowgun.

groove thoroughly, first with medium and then with fine paper. The two halves are ready now to be glued together. The best glue is a cold waterproof or casein glue, mixed to the consistency of thin pancake batter; then allowed to stand for about 15 or 20 minutes and stirred thoroughly again. Spread this thinly enough on the flat surfaces on each side of the groove, to just barely cover them. Set the two grooved faces together, taking care not to let them slide around; and either clamp them together or bind them along the entire length with strips cut from an old inner tube.

When you have these glued together, and fastened as directed, take a good close look down the inside of the barrel. It is advisable to have a long, stiff wire handy, and push a rag through the bore if any irregularity shows; thus clearing out any drops of glue, which would be exceedingly hard to remove when dry. With the pieces fastened together, and the bore clear, lay the assembled blowgun barrel aside until dry. Once dry,

take off the clamps or wrappings and plane off the corners to an octagon or, if you wish, round it. Fine hard cord, such as rod winders use, is now wound about the gun at intervals of 6″ or so, the windings being about 1″ wide. At the muzzle end is well to make this winding a little longer. At the mouth end, or butt, you can make it a bit thicker by cementing on a few little pieces about 1½″ long and ⅛″ thick all around (Fig. 1) and then smoothing and winding it; or else just wind it with heavier cord, for 2″ of its length.

Ream out the mouth end to a funnel shape (see cross-section); then take the wire and run steel wool back and forth through the bore until it is polished. Continue to polish with wax.

Your gun is now ready to shoot. Next, split some bamboo into slivers about 12″ long and 3/16″ thick; or you may use very hard wood, of about the same dimensions, or darts of wire. Bicycle spokes are fine, as they are about the right diameter, and good steel. Cut these about 5″ long, and sharpen one end. Next, get some fine feathers, or small feather ends about 1½″ long, and lay them with the quill ends towards the point, all around the wire, leaving ½″ of the tip of the dart exposed. The best method is to set a few around the dart; take a couple of turns of thread around the ends of feathers; add a small drop of glue to the ends; continue the winding about an inch down the shaft; and fasten with a blind hitch. You will have to judge the number of feathers needed to fill the bore, but not too tight; as the purpose of these feathers is not only to guide the dart, but to fill the cavity so that the air must force the projectile out of the bore.

If you desire pellets for collecting specimens, roll a bit of clay (modelling clay will do) into a rod the size of the bore of the gun; cut it into cylinders, ¾ the length of the diameter, and roll the cylinders between the palms until round. You can make these quite rapidly, and you will soon learn to judge how large a lump to take to make a ball.

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When these are dried, they are ready for use.

For a home target, use a piece of any loose, fibrous wall board—not too hard—or even a piece of ordinary cardboard. Make a 1″ circle for the center; the second band is 1½″ wide; and the next two are each 2″. Paint to suit.

To shoot, the dart or pellet is seated in the bore at the butt end; the mouthpiece is pressed snugly, but not too hard, against the lips and the dart expelled with a quick puff. Do not puff out the cheeks as you would in playing a horn; force the air from the lungs with a contraction of the diaphragm, with absolutely no cheek filling. There is no need to strain.

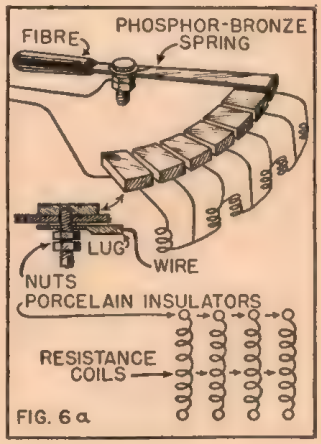
To aim, simply point the thing at the object and shoot. It automatically points itself at the target, apparently centering itself like a peep sight. Anyway, it goes straight to the mark, and you don't need a sight of any kind. I have used the blowgun to get rid of English sparrows, which were a pest at home; a pellet would knock Mr. Sparrow for a "loop" when it connected with him. I have also secured many fine large moths, and other insects, out of ordinary reach; these were mounted for use in school classes.

Electroplating for the Amateur

(*Continued from page* 59)

will run from 3 to 6 amperes or more, and the voltage should be checked in accordance with the usual recommendations for the different metals to be plated.

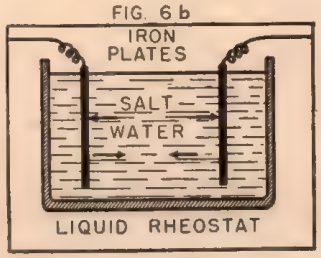
In Fig. 6a, there is shown a detail of a substantial rheostat switch



This illustration gives the details for making a wire rheostat, which may be used for regulating the current in electroplating baths.

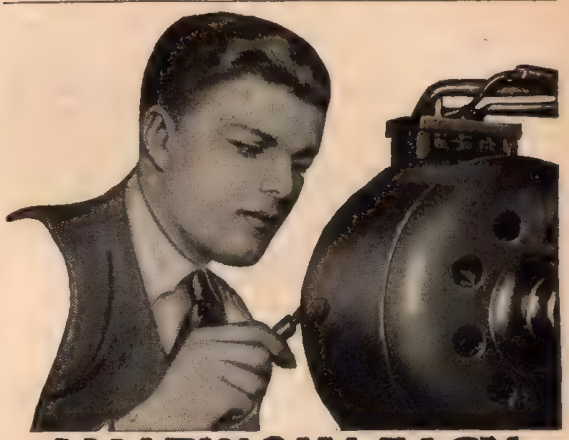
made of copper or brass segments with screws threaded into them. One method of supporting the resistance coils on porcelain knobs is shown in Fig. 6a. Fig. 6b shows how to make a saltwater rheostat, in which the iron or copper plates can be moved toward or away from each other and the plating current controlled in this way.

In Fig. 7 it will be noted that the objects to be plated are suspended in the bath in a glass or earthenware plating tank, and being connected to the negative side of the circuit. The *anodes* or metallic plates (such as nickel) are connected to the positive wire and are slowly dissolved in the electrolyte, and the metal is deposited by the current on the objects hung from the negative wire. The metallic objects to be plated (such as brass, etc.) are not to be hung close to the anodes, but should be placed as far as possible from them to obtain a more even deposit of the metal. For extra good work, but not usually found in small amateur plating tanks, a motor-driven paddle is used, as shown in Fig. 8; this revolves very slowly, keeping the electrolyte in circulation and thereby causing a more even plating action.



A liquid rheostat will be cheaper to construct and will be found quite serviceable, but it is not as efficient as the wire rheostat shown in Fig. 6A.

Before any metallic object can be plated, it must be very thoroughly cleaned; if it is a casting, it is sometimes ground smooth on a fine emery or wire bristle wheel and then polished on a polishing wheel made of muslin discs, using rouge or any other polishing material sold in plating supply shops. A useful device for cleaning objects, especially where they are in the nature of castings and the like, is a circular wire wheel, the bristles being made of brass or steel wire. These grinding and polishing discs are



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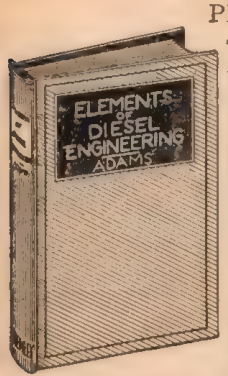

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frequently mounted on the end of the shaft of a small motor.

Not only is the cleaning of the casting important, but every trace of grease and dirt—even that deposited by the fingers in handling—must be thoroughly removed; for this reason objects are dipped in a hot caustic soda solution to remove all trace of grease, and rinsed in clear water, but never touched by hand again until after they have been plated.

After the object has been plated, it has to be polished and here the rag-wheel disc (Fig. 11) comes in handy; use rouge or other polishing materials to bring out the lustre. Be careful, when handling the objects around lye and caustic soda solutions, so as not to get these in the eyes.

If an object seems to be plating too heavily on one side, when examined from time to time during the plating process, turn it around when re-hanging it in the bath, and also increase the distance from the anode. Objects such as wax and gutta-percha molds, which are to be plated with copper or other metals, are dusted with powdered plumbago or graphite (which is brushed on, with a camel's hair brush, until a lustre is produced) before suspending them in the bath. If the current is kept down during the plating to a medium value, the processing will take longer in proportion, depending on how heavy a coat of metal is desired. A little experience will teach the amateur plater more in a short time than he will learn by reading a lot of instructions. It is logical, of course, that, if too heavy a current is used for the casting, the plating will not be as good as when it is given a fair amount of time with a medium strength of current. Too rapid plating is liable to cause "peeling."

The metals commonly deposited by the electroplating process are copper, nickel, gold and silver.

Formulas for the solutions and processes will be given in our next issue.

Using the Old Vacuum Cleaner

(*Continued from page 67*)

ranging a scene like that at Fig. 10; to give the effect of a snow storm, paper confetti is blown out between the wings or past a window in a "room scene." The confetti is fed into a hopper and will easily pass right through the blower and out through the funnel attached to the exhaust pipe. Here the hole in the nozzle of the cleaner is plugged up as shown.

Fig. 11 shows how the suction or intake nozzle of the old vacuum cleaner may be attached, by means of a tube, to the end of a syphon in order to start the syphon. This is particularly useful where dirty oil is to be syphoned from a pan when, of course, one does not wish to put his mouth on the rubber tube.

Amateur chemists, and also the house-wife, perchance, interested in filtering a little more rapidly, will be interested in the arrangement shown at Fig. 12. Here the vacuum cleaner removes air from the chamber in which the bag of mashed fruit or other substance is suspended. With an operating vacuum cleaner filtering will be done more quickly.

Those who have hot-air heaters in their homes have often found it difficult to get long pipe lines to function well. Here the old vacuum cleaner comes to the rescue again—arrange a funnel of tin or other metal to cover a good part of the register opening; the small end of the funnel connects with the smaller opening in front of the cleaner hose. The original floor intake nozzle is blocked off or plugged up. When the cleaner is operated, it will suck the air through the pipe and start the warm air circulating inside. With a little ingenuity the vacuum cleaner may be arranged also to create a draft of air into the cold air intake on a hot-air furnace and thus improve its operating efficiency.

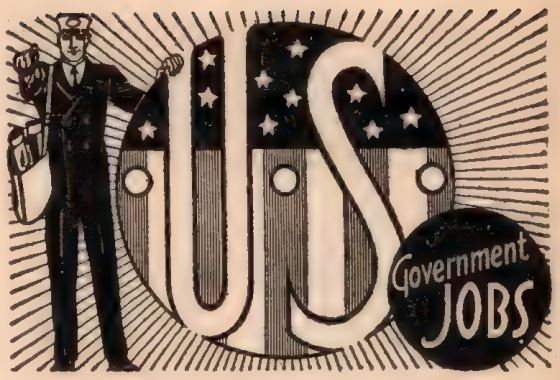
Ordinary illuminating gas is used in the home laboratory as well as the work-shop for brazing and other purposes. All that is needed to provide a good brazing flame is a draft of air, such as that which may be supplied from an old vacuum cleaner. The arrangement is shown in Fig. 14. The draft of air from the vacuum cleaner passes into the circular chamber or pipe surrounding a smaller pipe, through which the illuminating gas flows. The blow-torch is lit with a match, then the blower is started and, by regulating the amount of air and gas, you can obtain any desired degree of heat for brazing or other shop jobs.

From the Beginning

(*Continued from page 34*)

per regions, due to the ability of heated air to rise.

The rocks which make up the earth's crust can be roughly divided into two types. First, those which separate into thicker or thinner more or less horizontal layers and, secondly, those which do not make distinct layers. Even here care must be taken because one form may go over into another so that no simple statement of type is sufficient. At any rate two separate forces formed the rocks. The former are generally known as sedimentary—



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a rock building process still going on extensively and may be observed frequently in many places. In its simplest form this process is as follows. Rain carries dust like particles, sand and pebbles into lakes. When quiet waters are reached the suspended matter settles slowly to the bottom. This gradually thickens, becomes hard and, finally, rock-like. In this way layer after layer is deposited, one over the other.

On the other hand, plutonic rocks, such as granite, basalt, etc.; do not show such banded arrangement. They are igneous in character and were derived from the hot interior either by intrusion or by volcanic eruptions. When the molten mass filled deep cavities far below the surface, the cooling was slow and crystallization could go forward for a considerable time. This produced a coarsely crystallized rock mass commonly termed plutonic. If, on the other hand, volcanic eruptions spread the same type of rock over the surface of the crust, cooling must, of necessity, have been comparatively rapid and a microscopic examination of thin slivers is necessary to show the individual particles that make up such a fine grained or volcanic rock. Where the cooling was exceptionally rapid, volcanic glass was formed. Here the individual mineral particles had no chance to separate out.

Both of the above two general types may undergo changes and are then called metamorphic rocks. For instance, the plutonic granites, when exposed to stresses and movements of the earth's crust, change to gneiss, a thin, drawn out, banded stone somewhat like a sedimentary rock in superficial appearance. The sedimentary rock known as shale, when exposed to the same conditions, changes to slate, an exceedingly fine grained type with a remarkable cleavage which permits of splitting into thin sheets.

Few of the original plutonic rocks are still unchanged in their place of origin. As a rule they have shifted due to the folding and faulting of the crust. At times they stand on end or at an angle. Again they are bent and curved and distorted due to the motion of the earth's crust itself or due to the pressure of volcanic upheavals.

There are comparatively few rock making minerals although there are a large number of minerals found in rocks. The few characteristic rock making substances are always the same no matter where found and under what condition. Groups of similar stones are known as formations and these, again, are divided into the classification of age. The rock formations were built up gradually and slowly and not suddenly and all at once. In addition there are intermediate formations which go from one into the other so imperceptibly as to be classified with difficulty. Then, too, some formations may be absent in certain regions only to reappear again at a great distance. This absence is due to the fact that the particular type of rock could not, or was prevented from developing. The time required for its laying down cannot even be estimated. In one place it may have taken a comparatively short time while in another spot eons may have been required.

The earth is not stable. Everything is in a

state of flux. Change takes place constantly. Even the very rocks undergo metamorphosis. Nature is never satisfied with what it has created. It tries again and again to improve that which it has produced. Such changes by their very nature, are slow and subtle. This instability can be followed like a book, page by page, for those who can read. The earth has captured and imprisoned many a creature, long since dead, in its rocks. Naturally enough, only a tiny portion of the various types of life have thus been petrified and preserved for future study. The further back one goes the more fragmentary is the record. Of the archaic period itself no life is known, because the rocks of that period were a product of the internal fires of the earth. Organic inclusions were an impossibility, especially when such rocks as granite, syenite, dolerite, basalt, porphyry, etc., are considered. Such metamorphic rock making minerals as mica shists, quartzite, slate and marble, which make up a large part of the earth's crust, are just below the oldest fossiliferous stones of the so-called Cambrian formation with which the paleozoic age begins.

Life arose only after the battle between fire and water had taken place and the surface crust had lost its excessive heat. No one knows just when life did begin; at any rate the first signs appeared in the ocean. The first organic life must have been weak and puny, for even today, the lowest forms of animal life are nothing more than clumps of tiny and unsightly masses of protoplasm.

The shape and appearance of the first forms of life are unknown; with death, decay destroyed them utterly. It is quite probable that these were some kind of bacteria able to exist and propagate under fairly unfavorable conditions. Through evolutionary changes, algae-like forms undoubtedly evolved and, at the same time, lower animals arose, such as the microscopic foraminifera and radiolaria. Shells of these creatures have been found just above the oldest rock formations.

The slow onward march of the organic required enormous lapses of time and eon succeeded eon. While this was going on the very rocks themselves rose, fell and rose again, were changed but are still the same.

True enough the slates of the archaic period contain no definite fossils but the limestones of that age show the presence of graphite and combustible hydrocarbon, i.e. bituminous substances. It is these products which, by analogy to later periods and formations, lead one inevitably to the belief that these carbon products were of organic origin and that, due to the lapse of time and exposure to the forces, they are metamorphosed remains of unknown plants and animals.

The next article—"The Coal Age."

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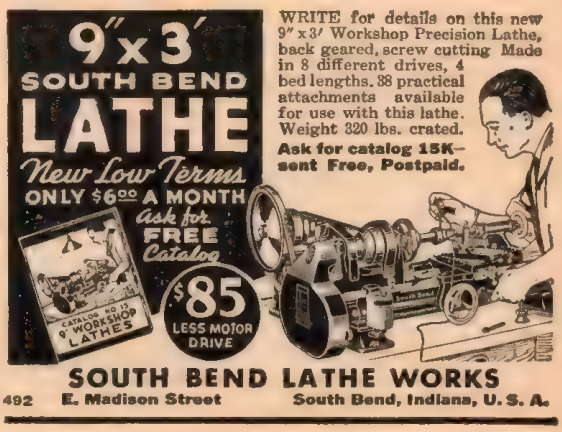
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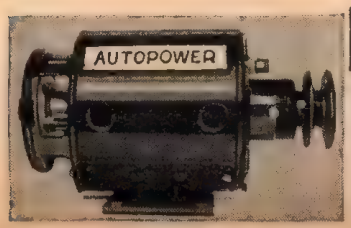

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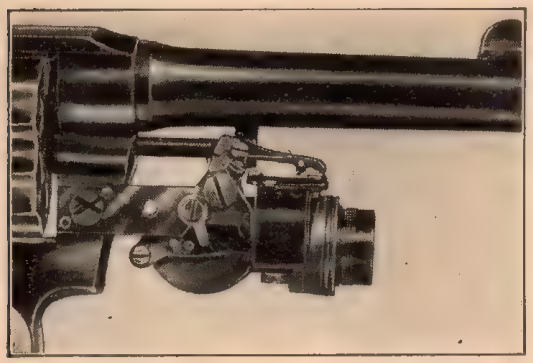
Gun Camera for Police

(*Continued from page 27*)



By means of just one screw, the gun camera is attached to a regulation service pistol.

which is not obtainable in any other way.

The new gun camera measures only 1½" from the tip of the lens to the end of the plate which attaches it to the pistol. It weighs only six ounces, lens included. It is constructed in such a way that it needs only one small screw to attach it to and remove it from the gun barrel. The entire operation of the camera —namely the exposure of the film and tripping of the shutter in the lens is controlled by the gun's trigger. The cartridge pin directly under the barrel does the turning of the film magazine and operates the shutter every time the trigger is pulled; this movement is synchronized with the action of the camera.

Perfect results can be obtained with this miniature gun owing to the advancement in the manufacture of fast films. The size of the film in the magazine is a little more than ¼", yet pictures taken with this camera are sharp enough to stand enlargement to 20" x 30".

The magazine containing the highly sensitive film has a diameter smaller than a 25c coin. There are only six exposures in each magazine. The film is wound around a six-faceted spool; each time the gun is fired, a new picture is taken until all six facets are exposed. A groove in the spool which holds the film firm against the spool acts also as check when all six pictures are exposed. Thus in case of further firing the exposed film will not be ruined by double exposure.

Furthermore, no matter how poor the aim of the police officer may be, the camera will bring the criminal easily within photographic range.

Tricks for Home Movie-Makers

(*Continued from page 43*)

flash powder, buy a couple of blank cartridges and remove the gunpowder.)

The newspapers are soaked in hot water for a few minutes, and then squeezed into shape, as much water being expelled from them as possible. They are held in position with thin nails, about 1½ inch long. When the paper is fairly dry, the scene is smoothed by being given a plastic coat, made by mixing the plaster and asbestos half-and-half, and adding just enough water to make it easily workable. Note that in molding the volcano, a hole must be left to hold the cigarette, placed in a holder and connected with the tube and bulb. This apparatus makes the volcano active.

The carbide simulates hot rocks rolling down the mountain; when they strike the water, it "boils."

The lava flow is faked by a trail of gunpowder or flashlight powder laid down the mountainside to the hut, which you have made of toothpicks, matches, or pieces of cigar box. A few match heads placed inside the house will insure its bursting into flame when the "lava" strikes it.

The holes to take the strings which control the movement of the boat and the fall of the carbide "boulders" may be made when the paper is being shaped, simply by putting heavy wires in place, to be removed when the scene has set. The strings are easily pulled through if attached to a long, thin stiff wire to serve as a needle. The background is merely painted with ink on a sheet of cardboard; incidental trees may be bits of hedge or fern.

To get the effect you want, get someone to take a picture of you, unshaven and ragged, seated in a boat and paddling like mad. Then have another picture of yourself taken crawling painfully out of the water onto a beach —any beach, so long as no background shows, and another showing you "dodging" large stones which fall into the water around you. (These can be thrown by friends, and the shots should be taken toward open waters just before a storm, with a dark-sky background.)

Between any of these shots, splice the picture taken of the miniature set. Waves are made by working the paddle; the boat is caused to progress by pulling its string. Smoke billows from the volcano when the rubber bulb is pressed; the "rocks" roll into the water when the string controlling their release is pulled. Lava flows down the mountain when your assistant lights the powder train, and the miniature house bursts into flame when the powder train reaches it.

No special lighting is needed. The scene can be shot in the back yard, on your roof or even in a window where there is good light. White cardboard reflectors will enable you to control the shadows. If you want more shadows, simply paint them in, with diluted black ink. But remember, when you photograph the action, get close enough so that none of the mechanism shows, and frame only the scene. Try to get everything to move slowly, then you can film the action without stopping your camera once.

If you want a scenario to build up to the shot, you'll have to write it yourself.

Miniature Historic Exhibits

(*Continued from page* 55)

The rails, forward and aft, are made of strips of cardboard ⅛" high, the front one being a 6" long piece bent in the center. The rear rail is about 1¾" long on each side. Taper them about 1/16" as they go to the rear. The forward rail is supported by three triangular pieces of cardboard, as shown on the plan. These may be placed on one (left) side only if desired.

The guns are carved from short lengths of balsa wood 3/16" in diameter. They are glued firmly in the ports you have cut out of the front and side. The pilot house (cabin, Fig. 11) is carved from balsa wood ⅞" in diameter and is pointed at the top. It is sandpapered and glued in place on the forward part of the top deck. Then the stack is made; it is a dowel ½" in diameter and 1⅛" high, glued to the top deck behind the cabin. Around the stack, about ⅛" from the top, is a cardboard ring 1/16" wide. It is glued in position.

All fittings are made from balsa and cemented in the places shown on the plans. Vents are carved from ⅛" square lengths and are glued to pieces of cardboard, which, in turn, are glued in place on the top deck.

The whole and wrecked life-boats (Fig. 12) are made of balsa to the size given. The boat which is whole is mounted on a rest or framework of 1/16" bamboo (glued to the sides) or side of the model; the nearest side is the only one that shows, so, if desired, only one need be made. The life-boat, in turn, is glued to the frame, and behind it the wrecked boat is cemented. Leave the bow of the wreck projecting above the life-boat.

Other bits of wreckage are simply short pieces of bamboo and balsa cracked in half and glued around the stack and pilot house. The broken stay wires of the stack are thin wires bent to shape and glued in holes made in the stack. Flagpoles are 1/16" bamboo sandpapered round and inserted in pinholes in the top deck. The starred flag goes on the forward pole and the striped flag on the rear. Make them of paper or thin cloth. Use oil paints to color the flags. They are rather hard to work with, but they do not run and therefore are best. Only one side of the flags need be painted.

The Merrimac is colored the same as the Monitor, except that it is a bit darker. Remember that the fittings decrease in size just as those of the Monitor, as you go to the rear of the vessel. Remember, too, that the shading of the paint does more to produce the effect of depth than anything else, so use care and patience.

The scale model of the Merrimac (Figs. 14, 15 and 16) is built up of two solid blocks. One forms the bottom, which is carved separately, and the other the top. The bottom of the hull is carved to shape with the aid of templates taken from the half-breadth plan (Fig. 17), which is drawn twice the size of Fig. 16 and must be reduced. A center line is drawn front and back, top and bottom, and the deck and profile.

The block is cut first to deck and profile plan and stations numbering 1-7 are marked

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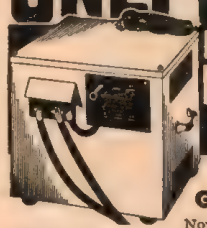

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on the hull. Then, beginning with station 4, the hull is trimmed down until the templates *nearly* fit their respective positions; however, never trim any one place down until it fits the template exactly. Do several at a time, allowing enough space so that when the hull is sandpapered smooth the templates will all fit their positions perfectly. In this way you can make an accurate hull.

The top is then cut to shape and set in place; then the details are added. The boats and propeller are best purchased. The keel and rudder are most satisfactorily made out of clear well-dried pine.

In the background there is a small ship. This tiny boat is carved carefully from balsa wood to the shape shown on Fig. 18. The masts are of bamboo, sandpapered to about 1/16" in diameter. There are four spars on the forward and main mast, two on the mizzen mast. Cut paper may be glued to the spars to represent furled sails. The rigging is very thin black thread. The stack is a length of matchstick about 3/16" long. The boat may be finished in black with a checkerboard stripe down the side and yellow spars and sails. A good picture of the Man-of-War of that period will help here better than any description. Remember that this small ship, as well as the larger ones, must be cut to perspective, and that the color must blend from a dark tone in front to a light tone in the rear. This little ship is the most important part of the set, for it lends depth and color to the entire scene.

The "stage" or cyclorama in which the models are placed is very easy to make and the builder will have little trouble with it. A fair amount of patience is the only real requirement.

The back or cyclorama of the set is made of papier mache, Fig. 19. It is shaped by moulding several layers of paper on the rear of a pot or similar object, or on the inside of a mixing bowl, of the correct size and starched or glued together. The drawing will give you an idea of how it is done. Five or six layers should give you plenty of strength. Allow the sphere to dry thoroughly before attempting to remove it from the forming object. Any torn places may be fixed by adding an extra layer of paper very carefully over the ripped part. However, this must be done only after the background is thoroughly dry.

For the base, a piece of flat wood ¼" thick is used. It should measure about 12" square. Using the back as a template, draw a line on the base, using the inside as a template, and cut the board to a semi-circular shape with a jig- or band-saw. Then sandpaper the edge to take off any "bumps."

Next mix about ¼ lb. of plaster of Paris with water. This is raw material for waves. Be sure that the mixture is nearly water-thin. Now slowly pour the plaster on the board and let it settle evenly. (You may make a cardboard rim ½" high and tack it temporarily around the edge of the platform to stop the plaster from running over.)

The plaster should not be any less than 3/16" thick and not more than ⅜" thick. If the layer is not thick enough, allow the first layer to harden and then repeat the process. However, in this case place the boats in position (Monitor and Merrimac only) before applying the final layer.

If the first layer is satisfactory, place the two large boats in position *before* the plaster has begun to dry. The process is simple, the only thing you have to be careful about is that the plaster does not cover the deck of the Monitor, and that it covers the rear (hull or bottom) of the Merrimac only. To set them should take but a few seconds, for they are placed in position and pressed down gently until they almost touch the floor (board or first layer of plaster). The waves (Fig. 21) are "blown" on. Do just that. Blow over the plaster until it forms small wave-like ripples.

The waves run from right to left rear (the smoke and flags go the same way). Then the plaster is allowed to harden. If the waves fall, continue to blow gently until the plaster becomes hard enough to hold form; it will take a moment or two. Allow at least three hours before attempting to paint the scene.

In the meantime you may make the front of the set, Fig. 22. It is a piece of stiff cardboard and is cut to the shape of a frame. The measurements between the border of the frame may be found on the plan.

In back of the frame a piece of glass is placed, much the same as that of a picture. The glass is glued to the frame, as shown. It may be made removable if desired by using a slide arrangement. However, any such arrangement is best left to the builder's choice.

Assuming that both base and cyclorama have dried and the rough spots have been taken off each, they are glued together, Fig. 23. The fitting together of the parts must be done very carefully. It is best to nail as well as glue the back to the base; this helps prevent any of the paper layers from peeling off after the glue has hardened, and also increases the strength of the set. However, be very careful when nailing the back on, or the plaster will crack and break off.

Now that the two parts have been put together, you may add the small boat; the plan gives you the position. It should be glued firmly in place.

The set is now painted. You will have to blend your own colors, for it would take a separate article to describe how to do it, but since most model builders are artist-like, you should have no trouble. It must be remembered that the sky and water are nearly the same shade of blue.

The sky becomes lighter as it meets the horizon, and darker as it goes up and behind the Merrimac. Two different shades of blue are used. The waves are capped with white here and there to give them effect. The troughs of the waves are a dark blue and the tops gradually become lighter. A bit of green may be added. However, do not put too much green in the water or you will spoil the appearance.

The smoke from the guns and the stack of the Merrimac is made from ordinary cotton, thinned out. The plan and picture will give you the positions of the cotton (smoke). Thin out the cotton so that it is not bulky and slowly form it to shape. Then glue it in position. This should be done carefully for the

arrangement of the cotton will either destroy the scenic effect or add the finishing touch of realism.

When all necessary work has been completed on the scene, the front (frame) may be put in place and the back and floor glued directly to the frame, as shown. The latter is then painted; the back of the sphere (outside) is plain black and the front or frame is red. After the paint is dry, small holes may be cut in the top of the back for small lights to illuminate the scene. Vari-colored bulbs give different color tones. Select the ones you like best.

Lathe Hints and Odd Kinks

(*Continued from page* 61)

tool is in lathe work, and by observing a few simple rules, finishing work to precision limits can be made a simple and positive operation. First of all do not expect a file to displace the round nose finishing tool bit: in short, file only to smooth and finish, not to shape or dimension the work for more than a few thousandths of an inch. Secondly, for lathe work use only files that are single cut, that is, having continuous teeth in one direction only. Absolute cleanliness is important, and single cut files are easier to clean with a file card or stiff brush. Clean the file thoroughly before each job: steel particles lodged in the teeth from a previous job will work havoc on aluminum or soft brass work. Apply chalk to the file every ten or fifteen strokes and periodically tap it on a piece of metal to shake out particles, only do *not* acquire the common habit of striking the bed or any other part of the lathe. Lastly, let the lathe furnish the power not the hand, which means apply far less pressure on the file than for ordinary hand filing. If possible lift the file completely off the work on the back stroke.

Oddities of Physics

(*Continued from page* 37)

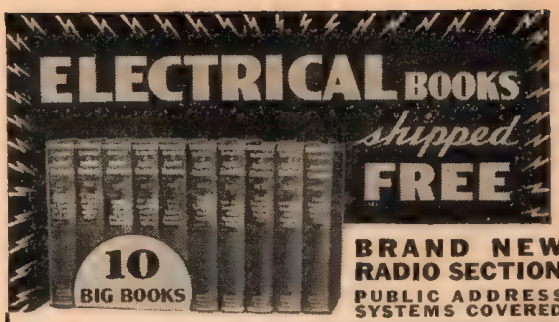
The answer will surprise you! The result is a sort of *white*, which may be somewhat gray, depending on how pure the original colors were, and how well the combination was matched.

Is it possible to wash one's hands in boiling water without scalding them?

Yes, if you are on top of a high mountain; at such a location the boiling point of water is much lower than at sea level. At an altitude of 7 miles the boiling point of water would be as low as 65° C. A difference of one degree C. in the boiling point occurs with a change in the elevation of about 295 meters (967 feet).

Is the noise heard in a sea-shell the roar of the ocean? If not, what is it?

Is the roaring sound heard in a sea-shell actually the sound of waves?



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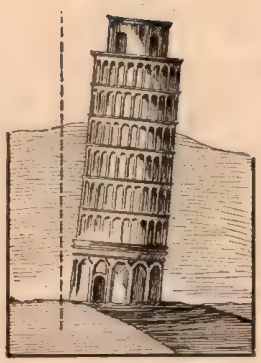
The answer is, no! The peculiar roaring sound heard in the sea-shell, when held close to the ear, depends upon the phenomenon discovered by Helmholtz, that if we have a quantity of air enclosed in a chamber of a certain size, this mass of air will have a natural vibration rate or period of its own, and that it will amplify any faint sound which may impinge on it if this sound has a similar vibration rate. Sounds from outside the shell cause the air mass within it to vibrate by acoustic resonance or vibration, and produce the "roar."



Was the tower of Pisa built vertical or was it made to lean?

Is it easier to swim in salt water than it is in fresh water?

Yes, because the salt water has a greater density and buoys up the body with greater "force." The water is so salt in the Great Salt Lake it is said that one cannot sink in it.

If two balls are released simultaneously and fall downward in curved paths, as shown in one of the illustrations, which ball will arrive at its destination first, the one on the upper curve, or the lower one?

The ball destined for the upper basket will reach its destination first for the reason that the *vertical fall* is less for this ball than it is for the ball No. 2.

Is the north magnetic pole located in the vicinity of the north geographical pole of the earth, the south or the north magnetic pole?

The usual answer is that this is the *north* magnetic pole, and for many years mariners considered it such. However, it is now considered as a true *south* magnetic pole. Thus the lines of magnetic force pass out from the north magnetic pole (in proximity to the south geographical pole of the earth) and re-enter the earth at the south magnetic pole, near the north pole of the earth. The point of the compass needle attracted to the so-called *north* pole of the earth is actually the *north* magnetic pole of the compass bar or needle, and thus obeys the first law of magnetism, that *like* poles *repel,* while *unlike* poles *attract* each other.

If a tree fell with great force and no one was present to hear the sound it made, would there be any sound?

The answer to this question was the subject of an extensive scientific discussion in a well-known magazine. The problem is not a new one. The answer, however, depends upon the definition of the word "sound" selected by the person who wants to argue the point. One definition demands that the organs of hearing be stimulated. But scientists today will choose the broader definition, which covers vibrations set up in air, or some other medium, which would produce the sensation of sound if they were heard by the human ear.

An explorer was descending rapidly in a balloon. He climbed over the edge of the basket, hung from the bottom and settled into water almost to his hips. At this point the balloon stopped descending and valuable records in the basket were saved. Why did not the balloon basket settle to the surface of the lake?

Answer—the buoyant force of the water removed some of the weight from the balloon and the state of equilibrium was reached when half of the explorer's body was submerged.

One of our illustrations shows an aqueduct which carries a considerable stream of water; the question is, if the stationary columns for this aqueduct were designed to carry only the stream of water, could a heavy ship pass along this aqueduct without wrecking the structure?

As long as the vessel floats in the water, its weight is distributed equally over the bottom of the aqueduct, so that the weight in any given area of the bottom, such as a square inch or square foot, is relatively small. Of course, the water displaced by the ship weighs exactly as much as the ship itself.

What causes thunder which accompanies a flash of lightning?

The noise we know as *thunder* is caused by the air rushing into the vacuum created along the path followed by the lightning flash.

Popular Magic

(*Continued from page* 63)

sible trick is simple to operate. What appears to be a black stick is in reality a white dowel over which rests a cylinder or shell made of black paper. This shell has a diameter great enough to permit the white stick to slide in and out freely. The apparent black stick is really white, covered with a shell of black paper. Therefore, after the sticks have been wrapped into their respective coverings, the conjurer, in the act of tearing away the wrapping, tears away the paper shells as well.

For our third demonstration this month, four or five small colored silk handkerchiefs and an ordinary tumbler are passed for examination. When these are returned to the performer, he tucks the silks into the tumbler carelessly. A spectator is requested to call for one of the colored handkerchiefs. Let us say the green silk was chosen. Placing the glass upon the table, the wizard makes a few mysterious passes over it, holding his hand twelve to fifteen inches above the tumbler. Slowly and mysteriously, the green silk handkerchief leaves the glass and floats toward the magician's fingertips. The handkerchief is passed for examination immediately, another color is chosen, and the performance is repeated until all of the silks have left the tumbler.

Explanation: A lady's long black hair (or a very fine silk thread) and a small pellet of bees wax, is the only additional paraphernalia necessary for accomplishing this startling effect. One end of the hair is tied to a button

of the magician's vest; a pellet of wax is permanently affixed to the other end of the hair. The wax pellet is stuck to the magician's fingernail until required. After the selection of a color is made, the necromancer presses the wax to a corner of the chosen kerchief, under cover of the act of carelessly arranging the silks in the tumbler. Looping the hair over his thumb and moving his hand upward accomplishes the journey of the silk from the tumbler into the performer's hand. These moves are repeated with each of the silks.

Refrigeration Servicing

(*Continued from page* 69)

commercial units, which includes 3/16, ¼, 5/16, ⅜ and ½ inch sizes. Larger sizes can be purchased if any work on ⅝ and ¾ inch tubing is contemplated.

How to Use Yoke Type

1—Assuming the end of the tube is properly cut, reamed and smoothed, slip on a flare nut. Get into the habit of slipping the nut on first, because, after flaring, the nut cannot be applied, especially if a flare exists on the other end, or if a bend occurs in the tubing.

2—Clamp tubing in proper hole in flare blocks. The end should project about a little less than one-third of the vertical depth of the countersunk hole. The flare is to be formed in this countersunk hole, so be sure to use this face and not the flat face of the blocks. Tighten the wing nuts evenly and firmly so that the tube is clamped tightly between the blocks.

3—Slip yoke over flare blocks and center above tubing. Figs. 6 and 7 illustrate these tools ready for use.

4—Place a drop or two of refrigeration oil (no other oil will do) on the expander end of ram.

5—Revolve ram by means of the handle until ram is down hard and flare is fully expanded in the countersunk section.

6—Unscrew ram carefully and lift the expander end out of the flare. If the expander end rakes across the finished flare surface it will scratch it.

7—Hold finished flare to end of an S.A.E. fitting. The flare or skirt should be the same diameter as the nose end and cover all the surface of the face of same. If face shows, flare is too shallow. The flare *cannot* be returned to the blocks and made larger. It must be cut off and a new flare made. If the flare is too big, cut it off and make a new one. The flare or skirt must be of correct size.

Now, if you did not cut, or ream, or trim properly, it will show up in the finished flare. Split or ragged edges indicate faulty preparation. A perfect flare is smooth of edge and correctly sized.

Using the Punch Type

This is the older type and for a few years it was out of style, but is now coming back into favor again. This tool requires a little more skill to use than the yoke type.

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To use this tool, proceed as follows:

1—Slip nut over tubing, which has been cut and trimmed.

2—Insert tube between blocks in proper hole.

3—See that end of tube projects one-third of the distance of the vertical depth of the countersunk hole. Then tighten nuts evenly and firmly to hold tube securely in place.

4—Apply a drop of refrigeration oil to the punch end.

5—Lock flare blocks in a vise or support on knees.

6—Insert oiled punch end in tube end.

7—Have punch in a straight line with tubing.

8—Tap punch lightly with a hammer of about 6 to 8 oz. weight. A ball-peen hammer is generally used for this.

9—While tapping, revolve punch with fingers.

10—Watch to see when flare is perfectly formed. Lift punch out and observe if punch is correctly centered. If not, try to work flare back to shape.

11—Remove flare from blocks and check the flare by holding it to the end of an S.A.E. fitting, as per previous instructions.

If a flare is too small or too large, cut it off and practice until perfect flares are made.

Rough, ragged ends indicate bad cutting, poor reaming or improper smoothing of the tube end.

An uneven lip or skirt indicates punch was not held centered and was off to one side.

A rough face indicates no oil was used on the punch end, the flared part having a rough or powdered surface.

Splitting of the skirt may be due to using heavy blows on the punch instead of light taps. Do not continue hammering once flare is made, for this will only thin down the flare.

If the tube end was over-reamed, the resulting flare will be weak structurally; hence, the previous admonitions not to over-ream and to trim the end smoothly.

To make up flare nuts be sure to use the special wrenches made for this purpose. Thin wrenches of the automobile type will round off the shoulders on the nuts, as these fittings are of brass. Brass is a comparatively soft metal, hence broad or thick wrenches are recommended.

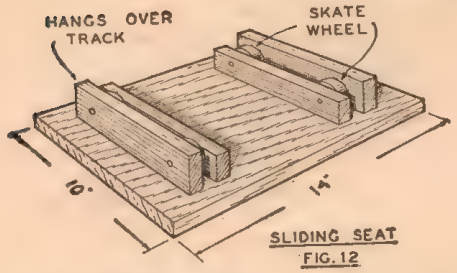
When screwing a half union into a service port or compressor opening, use a 12-point wrench. Such a wrench does not injure the shoulders. Open end wrenches will round off the edges, especially if any amount of pressure is required to make the joint tight.

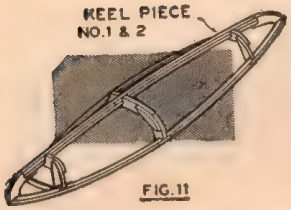
If you take a joint apart, check up on the flare and note if it is in good condition before making it up again. A thinned or split flare obviously should be cut off and a new flare provided.

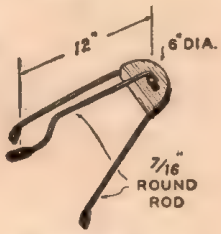
The service man and installer of refrigeration equipment must know how to produce sound flares rapidly. Practice until perfect. A few feet of tubing used to practice flaring is a sound investment, for it will save time and tubing later on.

Making a One-Man Racing Shell

(*Continued from page* 51)







OUTRIGGER FIG. 13

Next they are fastened down with 1" copper nails except at points of strain where screws are used. Marine glue is used at the stems. Since it is impossible to fasten four battens to the stem piece, the third batten down from the top ends at rib No. 1. Rib No. 1 should be notched at these points so as to prevent any bunches in the canvas later on.

There are four battens on each side and three on each deck. The battens should now be checked for smoothness of curvature, and the ribs shimmed up or cut down if necessary. After the bottom and side battens are put on, the boat is turned over and three battens put on each deck: the front deck starts at rib No. 4 and extends forward; the rear deck starts at rib No. 3 and extends rearward.

After the three main deck battens have been fastened down, another batten is fastened around the edge, but since it is quite hard to bend a batten edgewise, frequent cutting and fitting is necessary on these edge battens. Later they are planed off flush with the sheer pieces.

All the deck beams between ribs No. 3 and No. 4 of the cockpit may now be cut out so that the cockpit is 18" wide. The deck and the sides between ribs 4 and 5 near the short deck are re-enforced with ¾" material for the outriggers. The cockpit may now be fitted out with floorboards, tracks, coaming, etc.

Care must be taken when putting in the tracks to keep them the same distance apart all the way, and to make them as level as possible.

The deck along the sides of the cockpit is planked with pieces of batten material and then smoothed up carefully. The whole frame is then smoothed up, particularly on all the sharp edges and corners. A little plastic wood may come in handy for filling up a few holes and cracks.

The canvas is put on dry with marine glue on the keel and sheer pieces. It is first tacked down along the keel with ½" copper tacks, then it is stretched down tight on both sides at rib No. 6 and tacked with ½" copper tacks. Next it is stretched forward and down at the same time—just enough to take out the wrinkles—and tacked. This procedure is followed throughout. The tacks are about one inch apart and the stretching is done entirely by hand. One person alone can do a surprisingly fine canvassing job.

After the canvas has been put on, another ¾" square piece is put on as an outside keel to protect the canvas, and two outside ¾" half-round mouldings around the sheer pieces. An outside stem piece is also fitted around the outside of the canvas over the original stem, and put on with marine glue and 1½" brass No. 8 screws.

Airplane dope was used on this shell to fill the canvas. It worked very well, too. While the dope is drying, the sliding seat may be made. It is 10" wide and 14" long and constructed as shown in Fig. 12.

The outriggers are made by bending a 7/16" round iron rod about 3 feet long around a 6" diameter semicircle 1" thick and are riveted right through the wooden semicircle. The straight rod is bolted on with 2" x 3/16" flathead stove bolts. The entire is attached to the rowing shell with six 2" x 3/16" flathead stove bolts—Fig. 13.

The materials required for the construction are as follows:

MATERIALS

2 gross 1" No. 6 brass flat-head screws.
1 gross 1½" brass No. 8 screws.
14 board feet of ½" spruce.
5 pieces of ¾" square absolutely clear white pine or spruce 16' long.
12 pieces of ¼" spruce 1½" wide by 15' long.
2 pieces of ¾" square absolutely clear white pine or spruce 5' long if it is to be used as a rowing shell. These are the tracks for the sliding seat.
1 pint of aviation grade Marine Glue or some other good water-proof glue that does not dry too fast.
½ gross 5/8" No. 5 brass flat-head screws.
1 piece of canvas 15' long and 56" wide for covering.
8 feet of 7/16" round iron rod.
1 pound of 1" No. 16 copper nails.
½ pound of ½" copper tacks.

Into a Volcano

(*Continued from page* 24)

asbestos suits were tried, as were masks, but most important of all was the steel "gondola" in which the descent was to be made. The latter was designed to resemble a huge bullet with walls insulated with three-inch asbestos matting fitted with windows of mica. A crane was erected near the edge of the crater and tested for its safety a dozen times before actual descent was made by the journalists.

The day of actual descent was not made public for fear that it would attract a large crowd of curious and thus endanger the lives of the explorers.

The descent was made just at the break of daylight. The crane with its numerous cable supports was swung over the abyss and

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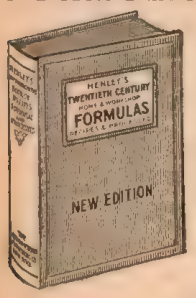

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the steel gondola began to descend slowly. About five hundred feet down the reporters sent messages over the improvised telephone that the air seemed clear and the sides of the crater could be seen plainly, with lava and mud bubbling out of deep fissures. However, as the descent increased the report came to the surface that loud explosions were breaking the deathly silence. The body of a suicide first came into view at 750 feet. Attempts to recover it proved unsuccessful.

At 1,000 feet the stark tragedy revealed itself. The hardy newspapermen began to shake with emotion. Remains of many other unfortunates were seen strewn all about them; some still in gruesome embrace—even death itself had proved incapable of separating lovers from each other.

Reaching a depth of 1,250 feet, the observers gave the order to pull up the "gondola." It was not that the heat was unbearable, or the masks were out of order, but that the force of eruptions, increasing as the explorers neared the lava bed, made the "gondola" swing so violently that there was danger of its being dashed against the crater's walls.

Unfortunately, the explorers could not take pictures below the 600 foot level because of the sulphuric mist. However, they proved that there was nothing romantic in this form of suicide, and also broke the Stromboli record. Furthermore, they made the first descent which was ever made into the very heart of an active volcano.

From the facts, scientists are planning to build other volcano gondolas, which will be supplied with oxygen and which will have a water sprinkling system to cool the outside metal should the heat become dangerous. Of course, the clouds of steam which would be formed would make visual examination of the crater's walls quite unsatisfactory, but it is probable that much would be added to our store of knowledge by such thorough exploration. The cover of the present issue shows such a polished steel gondola, designed for volcanic exploration. The pipes for water-cooling may be observed, and the water supply would be in the base of the structure. The asbestos lining would serve as a shield against the terrific heat. For photography at great depths a special asbestos-covered camera would be needed.

What to Invent

(*Continued from page 39*)

cause leather belts slip over the smooth surfaces of pulleys. The problem is a difficult one to solve but some day a real genius is going to supply a satisfactory answer. Merely roughening the surface of the pulley or the belt will not do. If the pulley surface were roughened, the belt would wear out very rapidly. If you want a ticket to paradise, here is your chance. Such pulleys would save many of our larger plants thousands of dollars each year. It should also be pointed out that "stickum" smeared on the belt is not a satisfactory solution — we have such things now.

There is available, on the market, what

amounts to a hypodermic needle for weeds; a little device that injects a killing chemical into the roots. More of these things are not sold because the home owner objects to the back-breaking chore of covering his whole lawn on his hands and knees. Where are our inventors that they can not come forth with a long-handled device to permit the user of such things to stand erect and squirt the chemical into the roots, better yet, where is the inventor who could produce a perfect one-shot weed killer?

Those who have examined the linoleum under an office chair equipped with casters will understand why some offices prefer wood or art-stone floors. The problem is that of finding some sort of a roller which would distribute weight more evenly. If one stopped to figure it out, it would be found that a pressure of many tons per square inch is exerted on the floor by the casters of an occupied chair. Even hard wood floors break down under such treatment. Of course, roller bearings could be used but the problem is to make them orientate themselves automatically when the chair is moved.

Furniture manufacturers would like to see a design for a dining room table incorporating a folding and disappearing table pad which could be tucked away neatly under the table. At the present time, such pads are used by millions, but the housewife has to fold them up and store them in a closet after each meal. Here is a catchy little problem of the "garden variety" which CAN be solved to the Queen's taste by a little application. The rack should be of wood although it could be made of pressed steel.

Summer is here again. Millions of people in this country would like to buy water wings which could be folded up and tucked into the vest pocket or pocketbook. Who can do that?

Most states now have laws requiring that bicycle riders use red lights on their vehicles at night. If such lights could be made to blink, they would become much more effective in protecting the riders, and would be more economical to operate. It should be easy to arrange some sort of a contact device on the wheel so that the light would go on and off a number of times during each revolution. The lights carried by "wheels" are not powerful due to the small battery that must be used. Such a system would therefore make the most of a weak light.

When screw threads are cut on a lathe, the operator must see to it that the cutting tool, at all times, is kept ground to just the right angle. In grinding such points, he uses a special gauge. What is needed is a special grinding tool which could put such a point on a tool quickly and automatically. Perhaps an attachment for an ordinary grindstone may be developed to do this.

The individual alarm clock has yet to make its appearance in this country and when it does, its inventor is going to reap a quick fortune. What do we mean by the individual alarm clock? We refer to a clock which will not awaken the whole household when it goes off. Perhaps the trick could be performed by placing the alarm unit in a small paraboloid reflector which would direct the sound toward

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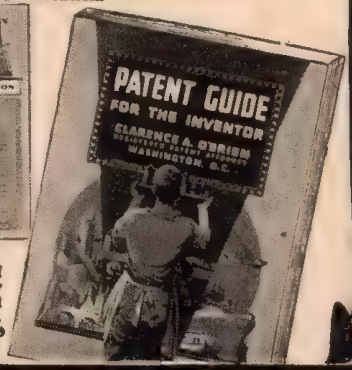

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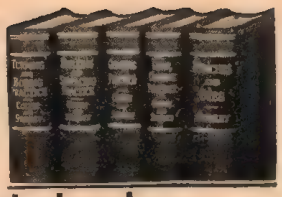

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the pillow of the sleeper. But this is just a suggestion; a better method should be found. The clock could have an alarm, the intensity of which could be adjusted. This would eliminate much undesirable noise and the sleeper could adjust the volume to meet his needs.

The hair paint brush is by no means satisfactory, but it is just one of those things that we have accepted as final without doing a great deal of thinking about it. Could we not develop a "brush" with a rubber reservoir and slit that would discharge paint at the proper rate, yet one which could be used in the manner of conventional paint brushes? Here indeed is something important to think about. The correct answer would run into big money.

Wooden screen doors are not satisfactory because they warp and sag. What we need is a light-weight, pressed-metal screen door that will last a lifetime. How soon we get it depends entirely upon how soon some careful inventor will devote himself to the problem. One of the troubles is finding a method to fasten the screen to such a door so that it may be replaced if needed and by a home mechanic; another, is the matter of adjustment for various door sizes. If these problems can be solved, the way is clear. We have the machinery today that will permit us to stamp out such doors by the millions and at a very low cost per door.

During the past two years the public has been showing a great interest in radios that are tuned automatically. The development should be carried a step further. We need preselector tuning — tuning controlled by a clock — so that a family may set the radio to respond to its favorite broadcasts after dinner. Thus, the radio could be made to skip from one station to another at the proper instant and through the medium of an electric clock, perfectly synchronized. Some day, and perhaps soon, we are going to have such radios and the fellow who covers the field with a few well-placed patents today is going to reap a large part of the reward that will be passed out.

Constructing an Emergency Brief Case Transceiver

(Continued from page 57)

obtained. The tuning of the receiver-transmitter circuit is accomplished by means of a small variable condenser, the shaft of which is slotted and accessible from the side of the case. This is adjusted for about 5 meters, or any frequency within that range which may be desired, and once set, no further tuning is required. When changing over from "transmit" to "receive," retuning of the variable condenser is entirely unnecessary, a feature which is attributable to the circuit employed and the unit's design.

Reference to one of the photos will show a small grille work at the bottom of the chassis. In this particular unit it was deemed advisable to mount a microphone within the chassis (single-button high sensitivity carbon microphone) so that only phones would need to be connected externally. However, the tip-

(Continued on page 96)

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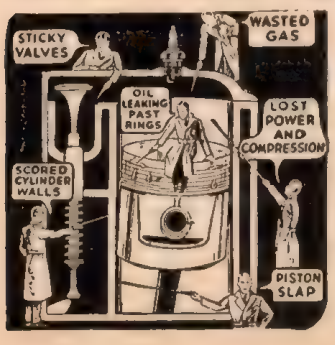

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The transceiver outside of its case.

(*Continued from page* 94)

jacks on the extreme end of the chassis were provided so that an external single-button microphone could be employed for close talking purposes. The other two tip-jacks, in the center of the chassis, are for headphone connection.

The schematic wiring diagram as well as a pictorial are shown. It will be observed that a single 1J6 tube is employed as either a super-regenerative detector (when receiving) or a unity-coupled oscillator when transmitting. The audio stages of this unit consist of two tubes, a 1H4 as a voltage amplifier or driver stage, and a 1J6 as a class B output stage. The "transmit-receive" switch switches this audio amplifier so that, when receiving, the detected signal is fed into the grid of the 1H4 tube, amplified and passed to the 1J6 tube from which it is then passed to the phones. In the transmitting position of the switch, the microphone is connected to the 1H4 tube, and the output of the class B 1J6 tube is fed to the plate circuit of the 1J6 oscillator tube so that it will modulate the carrier generated by the oscillator stage. Also, when the switch is thrown to the receive position, the voltage to the microphone is removed so that needless current consumption does not take place.

Further analysis of the diagram will show that the "on-off" power switch disconnects one side of the A battery circuit, although an improvement may be effected here by employing a two-pole single-throw toggle in place of the one used, if it is desired to play safe and disconnect both battery circuits when the unit is not in operation. A 10-watt 10-ohm variable resistor is employed in the filament circuit for reducing the 3-volt "A" supply to the requisite 2 volts which are required by the tubes in this unit. The inductance employed in the oscillator-detector consists of 4 turns of 3/16" or ¼" soft-drawn copper tubing wound around a broom handle, which should be approximately 1" in diameter. However, before winding the tubing, a sufficient length of the tubing (about 18 inches) should be measured off and the inner wire, ordinary push-back wire, should be inserted. Spacing of the turns is accomplished by simply working a screwdriver edge between turns, and the center of the coil should be filed on one side so that the inner winding is exposed and brought out for tapping. Should it be desired to use this same arrangement for 10-meter operation, instead of 5 meters, the same circuit and condenser may be employed, but an inductance consisting of 7 turns should be wound instead.

When this unit is completed and ready for testing, the receiving operation should be checked first. If the receiver is super-regenerating properly, a steady rushing noise should be heard in the phones, which will fade out when a station is received. For transmitting, the operation may be checked by the simple expedient of soldering the ends of a small two-turn loop to a conventional 6.3 volt pilot lamp, and then inserting the loop into one end of the copper tubing inductance. The lamp should light up brilliantly when transmitting; as a matter of fact, it may burn out if held too close to the inductance, and should flicker when the microphone is spoken into. To determine the operating frequency, a calibrated receiver may be employed, or a device known to amateurs as a frequency monitor should be used. CAUTION: DO NOT OPERATE THE UNIT AS A TRANSMITTER UNLESS LICENSED.

Complete layout of the unit and various parts is well illustrated in the photographs. Variations are permissible whenever the experience of the constructor deems it advisable.

LIST OF PARTS

The following is the material required for constructing this transceiver. The special transformers may be obtained from any regular radio mail-order house.

1 Aluminum Chassis, 9½"x14"x3". These dimensions may be varied somewhat to meet requirements.
2 Amphenol Bakelite octal sockets.
1 Amphenol Isolantite octal socket, for oscillator stage.
1 Kenyon or Freed special input transformer (T1), containing a single-button microphone winding along with a regular audio transformer winding.
1 Kenyon or Freed Class B Driver transformer (for single 19 tube).
1 Kenyon or Freed Class B Output transformer (to match a 19 tube).
1 Cornell-Dubilier .002 mfd. mica fixed condenser.
1 Cornell-Dubilier 50 mmf. mica fixed condenser.
1 Cornell-Dubilier .004 mfd. mica fixed condenser.
1 5,000 ohm 1-watt fixed resistor.
1 .5 meg. ½-watt fixed resistor.
1 .5 meg. Volume Control, without switch.
1 Yaxley or Eby 4P-D.T. switch.
1 Hammarlund HF-50 or APC 50 midget variable condenser.
4 Tip-Jacks, 2 red for phones and 2 black for microphone.
1 Small porcelain stand-off insulator for antenna connection.
1 On-off toggle switch.
3 Burgess type ZN30 portable 45V. B batteries.
1 3-Volt A battery.
12 Burgess 4.5 volt C batteries.
2 RCA or Sylvania 1J6 tubes.
1 RCA or Sylvania 1H4 tube.
Miscellaneous, such as knobs, scrap aluminum for chassis, screws, solder, spaghetti, 5 wire battery cable, etc.

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BROADCAST your voice on programs coming through your own radio set—make announcements from your house—inject wise cracks, Josh and mystify friends. Imitate radio stars, practice crooning, singing, radio acting, etc. Be a Bing Crosby, Charlie McCarthy, Jack Benny, Benny Goodman, etc.

World Mike

Made especially for home use, attached in a jiffy without tools. **Not a toy.** Put on your own programs at home, parties, club affairs, etc. Barrels of fun! Easy to operate.

Price Only 25c

DELUXE MIKE

Large, substantial, all-metal mike. Practice radio singing, broadcasting programs, thru your own radio. Generous volume, loud, clear tone with out distortion. Regular table model—can be held in hand. Guaranteed.

Price Postpaid **$1.00**

BLANK CARTRIDGE PISTOL

REVOLVER STYLE

50c

$1.00

Fine For Protection

Well made underfective. Pattern of other latest type of Revolver. Appearance alone will scare a burglar. Takes 22 Cal. Blank Cartridges obtainable everywhere. Great protection against burglars, tramps, dogs. Have this gun around without the danger attached to other weapons. Fine for 4th of July. Newsboys, start a pistol club. Set of two sizes, Medium Size, 50c. Large size revolver 50c per 100. Blank cartridges (cowboy type) 50c. Shipped Express Collect.

MIDGET POCKET RADIO $1.00

Listen to Music and Sports Everywhere You Go

This amazing midget pocket radio brings in programs within 10 miles of broadcasting station —even more under favorable conditions—in the country, in bed, at camp, office, etc., etc. **ANYWHERE** and **EVERYWHERE**. Merely connect an aerial and ground wire, attach single or double head phone and tune in. No expense to operate. No static interference. No batteries, no tubes, no crystal to adjust. Just one dial to locate stations. Size 3½x2½x1 inches.

MIDGET POCKET RADIO. Price..... **$1.00**

DeLUXE MODEL 4
PRICE $4.95
Built for phones only. Has 4 tubes, 4 dials, 1 unit. Operates like standard set. Same size as model... **$1.95**

Radio & Television Books

How to build inexpensive crystal sets, electric radio, battery radio, hints on building television set. You can SEE and HEAR television reception. Price... **10c**

VEST POCKET ADDING MACHINE $1

Adds, Subtracts, Multiplies & Divides

Here is a new pocket type of rapid calculator that enables you to add, subtract, multiply and divide in a jiffy. Does the work of a costly machine. Simple and accurate. No keys to punch—no lever to pull. Total always visible. Durable. Fits in pocket. Never in the way, but always ready for use. Strongly made, adds up to more than 1,000,000. With automatic pencil.

Size 2½x4". Price... **$1.00**

Deluxe Model $1.50

Learn To DANCE

OVER 100 ILLUSTRATIONS

Kiss, Swing Dances

LATEST STEPS. Be popular. Good dancers are always admired—always popular guests. Partners welcome them eagerly. The newest, smartest steps without a teacher. Don't be a wall flower when the music starts. Get lots of fun from parties or dances.

If you want to become a perfect dancer, learn to dance at home this new easy way. **BOOK TELLS** How to develop poise & control, improve your dance steps, art of holding, how to walk & march, how to lead, latest fox trot steps, Natural and reverse turns, the Reverse Wave, The Quickstep, swaying to the Waltz, Backward changes, the Continental, The famous Kiss dance, the Manhattan, the Collegiate Rhumba, the Carlo, Charleston, etc.

Price Postpaid **25c**

Add 10c for new course showing latest dances, Susie-Q, Big Apple, Peckin', Truckin', Shag, Postin', Shine, Swing-Hi, Swing-Low, etc.

Fits In Watch Pocket

$1.25 Made in U.S.A.

World's Smallest CANDID CAMERA

Although in size this camera can fit into your watch pocket, vest pocket or palm of hand, it will take some of the finest pictures you have ever seen. Accurately ground lens, precision built shutter and direct vision finder insure you of good shots with little difficulty. Takes 8 pictures, size ⅝ x ¾ in. upon each roll. Can be used for time and instantaneous snapshots, and locked so that no pictures can be taken. Pictures may be enlarged up to 8x10" still retaining an amazing amount of detail. Uses fine grain film that insures good snapshots even under adverse weather conditions.

Film easily removed and inserted. Price... **$1.25**

For 8 more camera exposures. Price... **10c**

Complete Outfit consisting of Camera, 2 Films and Leather Case: Price Postpaid.. **$1.90**

Candid Camera

45c

Precision optical instrument in which engineering and mass production have been combined to permit high quality photography at low cost. Fixed focus. 1-25 second shutter, fast and wide latitude, fast film eliminates extensive problem. Roll takes six pictures, size 1⅝ x 1⅝ x 1¼ inch pictures.

Candid Camera that Carries Spare Film within Itself!

Camera, Price... **45c**

Films per roll **25c**

TELEPHONES 15c PAIR

No Batteries

Here is a series of phones which carries the voice perfectly for distances from 50 to 100 feet, yet they sell for only 15c a pair! Uses no batteries, electricity or current in the one connection. Talk back and forth to each other, from workshop to office, etc. Each phone acts both as a receiver and transmitter. Set complete with two phones, transmission wire and instructions. Price Per Set Only... **15c**

Live Chameleon

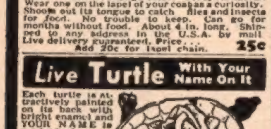
Watch It Change Color!

A LIVE PET

Get one of these most wonderful of all creatures. Watch it change color. Study its habits. Wear one on the lapel of your coat as a curiosity. Shoots out its tongue to catch flies and insects for food. No trouble to keep. Can go for months without food. About 4 in. long. Shipped to any address in the U.S.A. by mail. Live delivery guaranteed. Price... **25c**

Add 20c for lapel chain.

Live Turtle With Your Name On It



Each turtle is attractively painted with your name on its back with bright enamel, and YOUR NAME is printed right on. These turtles are extremely gentle and will live for years and years without any trouble. Study their habits. Safe, live delivery guaranteed. Print your name clearly. **PRICE POSTPAID**

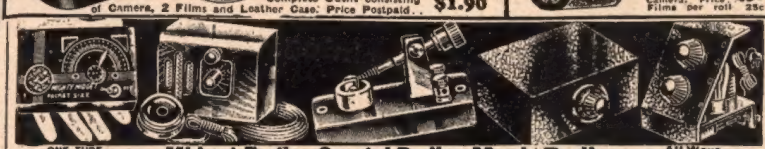
Turtle Food, Per Package Postpaid **10c**

35c

WONDERFUL X-RAY 10c

Apparently See Through Flesh, Etc.

GREAT CURIOSITY! With it you can apparently see the bones in the fingers, lead in a pencil, even the flesh seems transparent. Ready for use. Price... **10c**



ONE TUBE
POCKET RADIO

1-Tube Pocket Radio with built-in phone. **MUSIC DIRECT FROM RADIO.** Beautiful Cathedral tone. Complete in one unit with batteries, tube, switch. Fits in pocket. Listen anywhere with good aerial and ground. Uses ordinary flashlight dry cells. Latest circuit. Price Postpaid... **$3.49**

Midget Radio

Beautiful midget mantel crystal radio. No batteries, no tubes, no expense. Receives stations within 25 miles. Radio complete with phone, wire for ground and aerial. Ready to use. Swell for desk, bedside, etc. Good clear tone. Easy to hook up. Lasts a lifetime. Price Postpaid... **$1.99**

Crystal Radio

Complete Radio. 25c! Get reception within 25 miles of radio. All you need is aerial & phone. Completely assembled & wired. Sensitive crystal. Reception guarantee. No tubes, no batteries, no expense. Has 2 connections and it's ready. **25c**

Price Postpaid... **25c**

Single Earphone... **85c**

Magic Radio

Covers broadcast band only. 350 mile Reception. Bristol board cabinet, tuning dial, clips, condenser, resistor, hook-up wire, wiring diagrams. RCA tube etc. Complete kit with tube. Fun and educational to build. Loudspeaker phone volume. Price Postpaid... **$1.10**

Single Earphone... **85c**

All Wave
World Wide Radios

Remarkable results—simple operation. Covers 18-600 meters, police, amateur, broadcast, code. Short wave condenser, set. Kit with coil, tube, phones not included **$2.00**

2-Tube Battery Kit

2-Tube Electric (AC-DC current. No batteries) Price **$2.99**

Either set wired, 75c extra.

Complete Drawing Set 35c

Have fun drawing with this snappy set! Square, 2 triangles, French Curve, etc.

FOR Drawings Artists Designers Sketches

Price Only 35c

BIG ENTERTAINER

326 Jokes & Riddles, 25 Tricks, 10 Parlor Games, 3 Tongue Twisters, 13 Stories, 105 Money Making Secrets, 22 Menu Suggestions, 21 Problems, Comic Recitations, Funny Readings, 10 Parlor Pastimes, 12 Puzzles, 100s Names & Their Meanings, 10 Optical Illusions, 3 Amusing Experiments, Deaf and Dumb Alphabet, Shadowgraphs, Fortune Teller, Fortunes with Cards, Crystal Tea Cup, etc. Horoscope, Verses, Cut-outs for Checkers, Chess, Dominoes, Fox and Geese, 15 Mere Mortal Anagrams, 25 Card Tricks, Crystal Gazing, etc. Now published in one big volume. Price Postpaid... **15c**

Boy Electrician Tells how to make batteries, dynamos, motors, telegraph apparatus, telephones, bells, electric toys, motor boats, electrical engines, etc. 84 pages, 100 illustrations. Price... **10c**

Radio Controlled Model Boat & Plane

Easy to build and fun to operate. Entirely radio controlled. Complete plans... **25c**

Fencing & Archery Sets

Have Fun Dueling!

Learn to fence! Fight with swords (foils). Women as well as men should learn. Teaches you art of self-defense. Same as in boxing. Set consists of one steel foil (sword) 41 in. length, with aluminum guard and complete instructions on how to fence. **$2.50**

Hunting And Target Practice

Two smart archery sets for target shooting, small game, bird hunting, huntiers. Really economical to use. No limit to the fun. **Amateur Set.** Consists of 1 bow, 6 arrows. Price Postpaid... **$1.50**

Professional Set. 47½ in. triple fastened, steel bullet head arrows. 3 34" lemonwood bow, strung with pure flax. **$3.25**

THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

THE VENTRILO

A little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use. **Never Fails.** A complete book with full course on Ventriloquism together with the Ventrilo Sent Postpaid for only... **10c**

Climbing Glove Monkey Dummy

Charlie McCarthy Dummy

Small 9" model of Charlie McCarthy, the popular radio ventriloquist star. Learn ventriloquism like Edgar Bergen, and make Charlie talk! Price Only **69c**

Slip over hand like a glove, so you manipulate head and hands with your fingers. It climbs, nods, bows, even "talks" when you know ventriloquism! Absurdly realistic and funny. Provoke side-splitting merriment. Price... **15c**

Deluxe Mohair Model **50c**

Beautiful Blond Wigs 35c

Change Your Appearance

Change your appearance, and look natural. Short bob or curls. State choice. Each Wig only... **35c**

Here Are Some Classy New Novelties to Dress Up Your Bicycle

Compass

Know your direction! Handy floating, miniature-type compass clamps on handlebars. Price Postpaid **$1.59**

Hub Caps

Brilliant oversize jewels in side. Makes wheels look smart. Chromium. Quickly installed. Pair, Price... **69c**

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See behind you without turning head. Rear view. Nickel metal. Prevents accidents. Price... **49c**

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Protection against bumps! Makes bike look longer. Chrome-plated. Fits any bike. Only... **$1.49**

Speedometer

Shows your speed. Fits on handle bars. Accurate. Is easily attached. Specify 26 or 28" wheel. Price... **$2.75**

Hands Up! Pistol Cigarette Case 25c

It looks like a deadly weapon, but it's a clever novel cigarette case. Better than the real thing in many an awkward encounter. Great fun "sticking up" your friends. Three pulls and you have it, the trigger and the slide flies open, disclosing cigarettes. Price... **25c**

Bull Dog Fish Hooks

NEVER LETS GO! **15c**

Won't Let Go Catch 'em every time. Nibble shots. Throw off, and hooks the fish. When fish bites, the second hook strikes the fish outside the head. Then the fish pulls the lighter the hook holds. Simple, strong and durable. Use on any line. **NEVER LOSE A FISH.** Price Each... **15c**

Mystery Men's Secret Money Belt

Zipper Style, $1.49 Name in Gold, 25c

Protect Your Money

Has innocent look of high school belt, but, oh! how different. For salesman, collector, businessman and anybody carrying valuables. Secret money pocket hidden in the genuine top grade, cow hide, handmade. Smart buckle.

$1.19

Zipper Money Belt, $1.39. Name in Gold, 25c Extra.

REPEATING SLING SHOT

Automatic repeating slingshot that will fire 150 shots with one loading. Perfect for accuracy. Bulls eye every time. Extremely powerful and hard hitting. Swivels in handle, thick magazine. More power than an air rifle. Completely constructed with non slip grade leather rubber handle, thick lively cords. 150 BBs. Many hunters use Slingo for small game. Price... **25c**

100 copper coated BBs for only 10c postpaid.

Snappy YACHT CAPS

25c

Smart - Cool - Comfortable Captain's Cap

A swell looking yacht cap. Just the thing for you to wear during the summer. It looks good and it is good. Cool and comfortable. Every cap has a snappy white top with a peak vye shade. Gold braid and brass buttons. Anchor emblem on front of cap. Well made and finished. State size desired.

White Twill

Black oilcloth peak, sweat band gold braid & brass buttons with anchor. Well made. Smart looking. Price Each... **25c**

White Duck

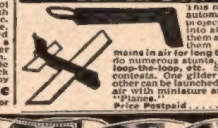
Superior quality white celluloid visor, gold cord, brass buttons and anchor emblem. Price Postpaid... **35c**

ELECTRIC BASEBALL GAME

Completely Electric - Select Your Play!

The pitcher can pitch a "Slow Ball," "Inshoot," "Fast Ball," or "Outshoot." Batter actually swings a bat! Works on latest new principle. Over 100 possible plays! Strikes, Outs, Grounders, Flies, Walks, Base Hit, Double, Triple, Home Runs, Errors, Baserunner hit by Batted Ball, Out at Home, etc. Beautifully constructed. Thrills, excitement. Shut Out Victories. Pitchers' Duels, Home Run Slugging. Complete with batter, pitcher, swinger, electric bat light flashes. Operates on flashlight batteries (not included). Price Postpaid Only... **$1.00**

GLIDER GUN



This novel gun automatically projects glider into air. Shoot them and watch them sail. Remains in air for long time. Will do numerous stunts, such as loop-the-loop, etc. Swell for contests. One glider after another can be launched. Fill the air with miniature armada of gliders.

Price Postpaid... **20c**

SNAKE MATCHES

Front row is snake with which to throw into long snakes when lit. Grows while match burns. Back row, regular matches. Shoot them at friend! He selects snake matches. You take the real ones!

Postpaid **10c**

3 for 25c

SWIM IN ONE TRIAL!

Water Wings

Water Wings Impart such confidence in water that everyone can swim at once. Expert swimmers use them to cover long distances, to swim in deep water, to rest while floating, etc. Up to 100 lbs. buoyancy. Can be carried in the pocket and blown up when needed. Price... **25c**

JU-JITSU DON'T BE BULLIED

30c

The Japanese art of self-defense. New methods of attack and defense are given. Illustrated so that you cannot help understand them. Deals fully with trips and throws, locks, body holds, defense against revolvers, strangling, wrist locks, scissors, splits, headlock, pinning a man down, double knee throw, stick attack, defense against knife, one hand throw, grip defense against two assailants, stomach throw, secret thumb knockout, nerve pinches, and numerous others. Learn to protect yourself under all circumstances. Your nature's weapons. Fear no man, tune of knives! "Secret Jiu-Jitsu" Only...

Marriage License 10c

& Fun Licenses

Printed with seal suitable for framing. Hand one of these to a friend. Your choice:

Marriage License
Doctor's Certificate
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Death Certificate
Birth Certificate
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College Diploma
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One Arm Driver's Cer.
Klutzer's Certificate
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Bootlegger's Diploma

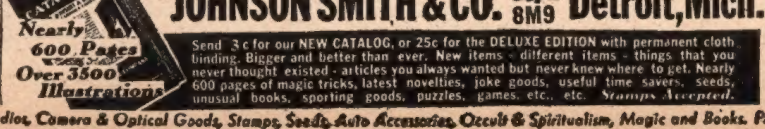
Price 10c Each License. Any 3 for 25c.

WHOOPEE CUSHION 25c

Whoopee Cushion is made of rubber. Inflated like a balloon, and then placed on a chair, couch, seat, etc. When the victim unsuspectingly sits upon the cushion, it gives forth noises that can be better imagined than described. Price **25c**

Sword & Scabbard

Fighting sword. Realistic blade of shiny flexible metal. Aluminum into metal scabbard which has chain attached. Length, 17½ in. Price... **25c**



Solitaire

Imitation diamond ring. Jumbo size. Extremely attractive looking. Very popular. Worn by businessmen. Price... **$1.00**

Photo Ring

With any picture full colors. Holds picture of your girl, friend, relative. Silver finish. Send photo with order. Specify Silver or Gold. Complete **59c**

SKULL & CROSSBONE

Oxidized gun-metal finish. Said to look good luck. Brilliant imitation ruby eyes. Price... **25c**

Sterling Silver Ring only **$3**

Aviation

Handsomely embossed emblem rings made to resemble rings worn by men in U. S. Government Service. Jumbo size, accurate detail, with American Eagle. State kind and size.

SILVER APPEARANCE. Each 25c

Sterling Silver $1.00; Gold Filled $1.75

Army Navy Rings

Roman

Jumbo oversize ring in two colors with imitation cameo. Extremely popular. State... **25c**

2-Initial

Impressive. Your own initials right on either side of ring. Be sure to specify your initials in Print. State Size... **35c**

STUD

Imitation diamond stud. Big stone prongs. Looks real when you hit something in it. Gold plated. Does double duty. Size... **35c**

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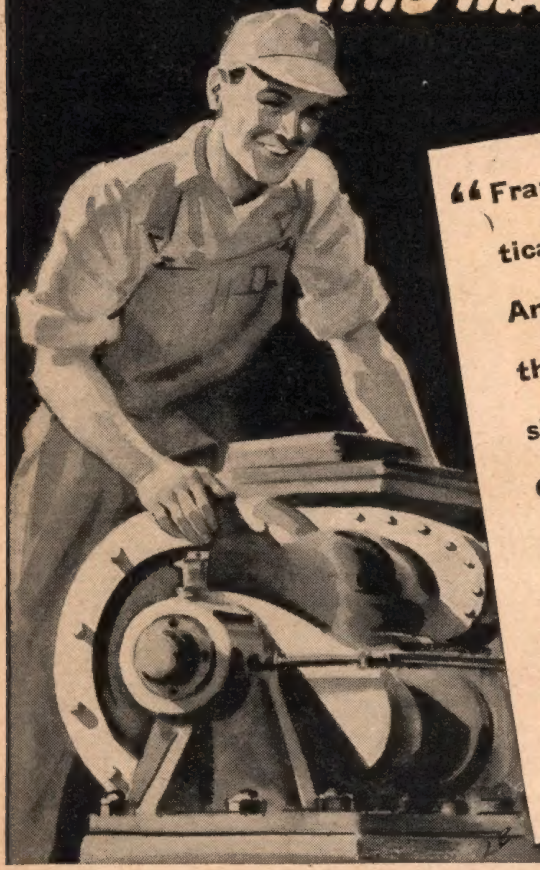
Send 3c for our NEW CATALOG, or 25c for the DELUXE EDITION with permanent cloth binding. Bigger and better than ever. New items - different items - things that you never thought existed - articles you always wanted but never knew where to get. Nearly 600 pages of magic tricks, latest novelties, joke goods, useful time savers, seeds, unusual books, sporting goods, puzzles, games, etc., etc. *Stamps Accepted.*

Special Catalogs on Radios, Camera & Optical Goods, Stamps, Seeds, Auto Accessories, Occult & Spiritualism, Magic and Books. Price 2c Each. All 8 for 12c

"I AM LEARNING NEW THINGS ABOUT THIS MACHINE EVERY DAY!"



"Frankly, I used to think that practical training was all a man needed. And I still say, nothing can take the place of practical training. But since I began studying that I.C.S. Course, I've realized that knowing why as well as how is mighty important. Putting why and how together has meant a couple of raises to me—and the first step was mailing a coupon to Scranton."

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 3628-L, SCRANTON, PENNA.

★ Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X: ★

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☐ Architect
☐ Architectural Draftsman
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☐ Boilermaker
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☐ Telephone Work ☐ Radio
☐ Mechanical Engineering
☐ Mechanical Draftsman
☐ Machinist ☐ Toolmaker
☐ Patternmaker
☐ Diesel Engines
☐ Aviation Engines
☐ Auto Technician
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Name.....*Age*.....*Address*.....

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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

FACTORY-TO-YOU SAVES YOU 50%

Also... $30.00 AND UP FOR YOUR OLD RADIO AS A SPECIAL TRADE-IN ALLOWANCE!

17-TUBE WORLD-WIDE MIDWEST

30 DAYS FREE HOME TRIAL

MIDWEST FACTORY-TO-YOU PRICE... $69.95
TRADE-IN ALLOWANCE... $30.00
YOU PAY ONLY $39.95 ABSOLUTELY COMPLETE

HERE it is—the radio headliner of the year—the sensational new 17-Vital-Tube 1939 world wide Midwest that just sparkles with new features. Regarded as today's greatest radio value, this Midwest gives you high-priced performance for what you would expect to pay for an ordinary 8 or 10-tube set. Use it for 30 days, in your own home, FREE, before you make up your mind. If you decide to keep it, you secure $30.00 credit and up on your old set.

MASSACHUSETTS— "Your Midwest has a marvelous tone quality that can make other radios on the market take a back seat." — Thomas F. Walsh.

This 1939 Midwest will delight you with its tremendous range (550 KC to 18,000 KC), glorious new tone and brilliant world-wide reception. Stations 10,000 miles away come in like "locals." Just imagine a radio so big, so fine, so powerful, so luxurious . . . in a big, beautiful, richly-finished Walnut console . . . at such an amazingly low factory-to-you price.

Let us tell you about our complete 1939 line with many features like Dial-A-Band Tuning, Electric Touch-Button Split-Second Tuning, Acousti-Filter, Fidel-A-Trol, Tun-A-Lite Indicator, and scores of other features.

TEXAS — "Mid-west's wonderful tone, splendid foreign reception and marvelous selectivity are second to none. Many of my friends say that in beauty and performance it is far superior to radios costing twice as much." — C. Huddleston.

Amazing New Easy Pay Plan

SEND FOR FREE 1939 FACTORY CATALOG

FACTORY-TO-YOU WHOLESALE PRICE SAVES YOU 50%

The famous Midwest factory-to-you plan, proven by 19 years of success, is just as exciting! You buy at wholesale prices, just like a dealer. You save up to 50%, and make your radio dollar go twice as far. Now, pay as little as 50c a week on the famous Midwest Easy Pay Plan. Remember, you get 30 days' FREE Home Trial. Midwest guarantees your absolute satisfaction.

PASTE COUPON ON 1¢ POSTCARD... OR

MIDWEST RADIO CORPORATION
Dept. 21BB, Cincinnati, O.

Send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer and factory-to-you wholesale prices.

WRITE TODAY!

Name.....

Address.....

Town..... State.....

User-Agents Make Easy Extra Money. Check here ( ) for details.

MIDWEST (factory-to-You) RADIOS

DEPT. 21BB MIDWEST RADIO CORPORATION...CINCINNATI, OHIO, U.S.A.

Manufacturers of Quality Radios Since 1920

STOP THAT ITCHING AND SCRATCHING

According to the Government Health Bulletin No. E-28 at least 50% of the adult population of the United States are being attacked by the disease known as Athlete's Foot.

There are many other names given to this disease, but you can easily tell if you have it.

Usually the disease starts between the toes. Little watery blisters form and the skin cracks and peels. After a while the itching becomes intense and you feel as though you would like to scratch off all the skin.

FOOT-ITCH
(ATHLETE'S FOOT)

Send Coupon-Don't Pay till Relieved

Beware of It Spreading

Often the disease travels all over the bottom of the feet. The soles of your feet become red and swollen. The skin also cracks and peels, and the itching becomes worse and worse.

It has been said that this disease originated in the trenches, so some people call it Trench Foot. Whatever name you give it, however, the thing to do is to get rid of it as quickly as possible, because it is very contagious and it may go to your hands or even to the under arm or crotch of the legs.

Most people who have Athlete's Foot have tried all kinds of remedies to cure it without success. Ordinary germicides, antiseptics, salve or ointments seldom do any good.

Here's How to Treat It

The germ that causes the disease is known as Tinea Trichophyton. It buries itself deep in the tissues of the skin and is very hard to kill. A test made shows that it takes 20 minutes of boiling to kill the germ, so you can see why the ordinary remedies are unsuccessful.

H. F. was developed solely for the purpose of treating Athlete's Foot. It is a liquid that penetrates and dries quickly. You just paint the affected parts. It peels off the infected skin and works its way deep into the tissue of the skin where the germ breeds.

Itching Stops Immediately

As soon as you apply H. F. you will find that the itching is immediately relieved. You should paint the infected parts with H. F. night and morning until your feet are well. Usually this takes from three to ten days, although in severe cases it may take longer or in mild cases less time.

H. F. will leave the skin soft and smooth. You will marvel at the quick way it brings you relief; especially if you are one of those who have tried for years to get rid of Athlete's Foot without success.

H. F. Sent on FREE TRIAL

Sign and mail the coupon and a bottle of H. F. will be mailed you immediately. Don't send any money and don't pay the postman any money, don't pay anything any time unless H. F. is helping you. If it does help you we know that you will be glad to send us $1.00 for the treatment at the end of ten days. That's how much faith we have in H. F. Read, sign and mail the coupon today.

Mail this Coupon

GORE PRODUCTS, INC., M H
865 Perdido St., New Orleans, La.

Please send me immediately a complete treatment for foot trouble as described above. I agree to use it according to directions. If at the end of 10 days my feet are getting better I will send you $1.00. If I am not entirely satisfied I will return the unused portion of the bottle to you within 15 days from the time I receive it.

NAME .....

ADDRESS.....

CITY..... STATE.....